THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—33RD YEAR. SYDNEY, SATURDAY, MARCH 16, 1946. No. 11.

Table of Contents.

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

	Page.
ORIGINAL ARTICLES—	
Penicillin Sensitivity of Streptococci Mostly of Groups A, B, C and G, by R. T. Simmons and R. Christie	349
Fractures of the Carpal Scaphoid, by J. R. Barbour	352
Placenta Prævia, by R. H. Syred	357
Report on a Series of Cases of Sinusitis Treated by Chemotherapy at an Australian General Hospital, by R. H. Bettington and G. K. Vincent	358
An Analysis of Deformities among Recruits, with Remarks on Sub-Standard Types, by W. E. Roberts	360
Young Dr. Storch of Adelong, by Richard T. Kennedy	362
Suture of Deep Soft Tissue War Wounds Aided by Penicillin Therapy, by Thomas F. Rose and Arthur Newson	364
REPORTS OF CASES—	
Leprosy: A Report of Nine Cases Among Natives of the Mount Hagen Area in New Guinea, by Nathan Shlimovitz	369
A Note on Two Laboratory Infections with the Virus of Newcastle Disease of Fowls, by S. G. Anderson, M.B., B.S.	371
REVIEWS—	
Progress in Neurology and Neuropsychiatry	371
Virus as Organism	372
Surgery for Dental Students	372
LEADING ARTICLES—	
The Treatment of Rheumatism by Dehydration	373
CURRENT COMMENT—	
The Health of the Pre-School Child in Australia	374
Congenital Afibrinogenæmia	375
The Prevention of Sunburn	375
ABSTRACTS FROM MEDICAL LITERATURE—	
Bacteriology and Immunology	376
Hygiene	377
BRITISH MEDICAL ASSOCIATION NEWS—	
Scientific	378
Notice	380
NAVAL, MILITARY AND AIR FORCE—	
Decorations	380
CORRESPONDENCE—	
An Unusual Case of Malaria	380
Epidemic Polyarthritis	380
The Treatment of Scabies	380
Inguinal Hernia and its Repair	381
Australia and Science: The University of Sydney and Scientists	381
Ulcers in the Mouth: An Appeal for Help	382
Recent Advances in the Diagnosis and Treatment of Lumbar Intervertebral Disk Disease	382
On the Prickly Heat	382
MEDICAL PRACTICE—	
Dangerous Drugs Regulations of Victoria	382
The Police Offences (Amendment) Act of New South Wales	383
POST-GRADUATE WORK—	
The Melbourne Permanent Post-Graduate Committee's Programme for April	383
Overseas Travelling Fellowships	383
NOMINATIONS AND ELECTIONS	383
AUSTRALIAN MEDICAL BOARD PROCEEDINGS—	
Queensland	384
A MEMORIAL TO THE LATE PROFESSOR JAMES THOMAS WILSON	384
OBITUARY—	
Wilfred Vickers	384
MEDICAL APPOINTMENTS	384
DIARY FOR THE MONTH	384
MEDICAL APPOINTMENTS: IMPORTANT NOTICE	384
EDITORIAL NOTICES	384

PENICILLIN SENSITIVITY OF STREPTOCOCCI MOSTLY OF GROUPS A, B, C AND G.

By R. T. SIMMONS and R. CHRISTIE.

From the Commonwealth Serum Laboratories, Melbourne.

THE sensitivity of hæmolytic streptococci to penicillin was first demonstrated by Fleming (1929), who tested the sensitivity of various organisms by the "gutter-plate" technique.

Tests for penicillin sensitivity of *Streptococcus pyyogenes* (three strains) were made by Abraham *et alii* (1941) by the tube technique, and the strains were found to be sensitive. Hobby *et alii* (1942) reported that hæmolytic streptococci amongst other organisms were sensitive to penicillin, but no details as to the number of strains tested or the Lancefield groups were given.

McKee *et alii* (1944) tested various organisms for penicillin sensitivity, and among these were five strains of *Streptococcus pyogenes* which were found to be sensitive.

Dawson *et alii* (1944) report having tested 50 strains of non-hæmolytic streptococci isolated from cases of subacute bacterial endocarditis; 10 of these strains were found to fall into Lancefield's groups B, C, D, F and H, and all except one strain were found to be approximately as sensitive as a standard streptococcus used for comparison. The tests were made by a tube technique.

Watson (1944) stated that in general the effectiveness of penicillin in the treatment of infections *in vivo* is closely paralleled by its activity against the same infectious agents *in vitro*. He tested the penicillin sensitivity of approximately 50 strains of streptococci of Lancefield groups A to N, isolated from human and other sources, by the tube dilution method described by Rammelkamp (1942), and found that there was little variation in sensitivity among the strains within any single group, and that the strains of all groups tested were penicillin-sensitive except those of group D. Strains of groups B, E, F, K and N were slightly less sensitive than those of groups A, C, G, H, L and M. The series included only 13 strains of group A streptococci and a few strains of groups B, C and G from human sources.

Rank (1944) has found that hæmolytic streptococci are the most rapidly eliminated of all organisms from wounds during penicillin treatment, and that they usually disappear in two or three days.

Various modifications of technique by means of tubes or plate tests have been suggested for determining the degree of sensitivity to penicillin of different organisms, but no large collection of β-hæmolytic streptococci isolated from human sources appears to have been tested to date.

The general opinion on streptococcus sensitivity to penicillin, as shown in the literature, is that strains of groups A, C and G are sensitive, strains of group B slightly less so and strains of group D relatively resistant. The purpose of the work reported in this paper was to examine the reliability of this generalization when a large number of streptococci was tested. Tests have been carried out on 721 strains of streptococci, mostly of groups A, B, C and G. The majority of these strains had been isolated prior to the advent of penicillin treatment, but a few isolated during penicillin treatment were included in the series. One hundred and thirty-five of these strains were from sources other than human.

The technique employed for testing the penicillin sensitivity of the cultures in this series was similar to that used by Dr. E. A. North of these laboratories in tests on the penicillin sensitivity of staphylococci. Various

concentrations of penicillin were incorporated in horse-blood agar plates, and the plates, after being cooled and dried, were inoculated with broth cultures of the streptococci to be tested. The results were read after incubation overnight at 37° C.

This technique[1] is simpler than either the "gutter-plate" or the tube method. It does not necessarily give results accurately comparable with either of these two methods, but it was considered suitable, since we were more concerned with variations in sensitivity within the groups than with the obtaining of absolute figures for penicillin sensitivity. It was soon found that when streptococci had been grouped by the precipitation test their sensitivity could be forecast with a fair degree of accuracy, and that only a limited range of tests was necessary to serve as a check.

Materials and Methods.

Strains Tested.

The following β-hæmolytic streptococci of human origin were tested:

Group A: 288 strains, representative of the 26 serological types of Griffith (1934) and the 12 Australian types described by Rudd, White and Ward (1939) and by Keogh, Simmons and Wilson (1941).
Group B: 102 strains.
Group C: 118 strains.
Group G: 72 strains.

The physiological characters and serological types of the B, C and G streptococci were described by Simmons and Keogh (1940).

The following miscellaneous strains were tested:

Group B: 120 strains of hæmolytic and non-hæmolytic streptococci (*Streptococcus agalactiæ*) isolated from bovine sources. These strains included the serological types isolated by Stableforth (1937) and five serological types isolated by Mr. D. Murnane from Victorian dairy herds (about 1940). A group of recently isolated strains before and after penicillin treatment were kindly supplied to us by Mr. D. Murnane and Mr. E. Munch-Petersen, of the Animal Health Research Laboratory, Council for Scientific and Industrial Research, Melbourne.
Group C: 12 strains of equine streptococci representative of the serological types described by Bazeley and Battle (1940).
Group D: Five strains.
Group E: Two strains.
Group F.: One strain.
Group H: One strain.

The Penicillin Used for Testing.

The calcium salt of penicillin II was used throughout the survey. Penicillin II is the type of penicillin in general use for treatment today. The standard samples were kindly supplied to us by Mrs. S. E. R. Baldwin, of the Penicillin Assay Department of these laboratories.

Representative strains of the various groups of streptococci A to H were also tested on blood-agar plates containing varying amounts of penicillin I and also penicillin III; the results obtained did not differ from those found with penicillin II.

Preparation of 6% Horse-Blood Agar Plates Containing Penicillin.

As an example details are given for the preparation of blood-agar plates containing one-twentieth of a unit of penicillin per millilitre.

Nutrient agar in quantities of 150 millilitres in flasks was melted and cooled at 46° C. To nine millilitres of sterile citrated horse blood in test tubes measuring six inches by three-quarters of an inch was added 0·8 millilitre of a freshly-prepared buffered-saline solution containing 10·0 units of penicillin per millilitre. The blood and penicillin were thoroughly mixed, warmed to 46° C. and added to the agar, the tube being then washed out with some of the mixture. The contents of the flask were thoroughly mixed and poured into four-inch Petri dishes (approximately 15 millilitres per dish).

Control Blood Agar Plates.

Blood agar plates without penicillin were prepared as described above and used throughout the tests in parallel with the penicillin plates to control both growth and purity of the cultures tested.

Control Cultures of Streptococci.

Throughout the entire survey, with each lot of cultures tested, we included three control strains. These were as follows: (i) a known penicillin-sensitive strain of streptococcus group A (Rammelkamp, 1942); this strain was obtained by Major P. L. Bazeley of these laboratories from Dr. C. H. Rammelkamp; (ii) a locally-isolated, penicillin-resistant β-hæmolytic streptococcus, not of groups A, B, C or G; (iii) an α-hæmolytic streptococcus which was partially resistant to penicillin. The second and third strains were amongst cultures kindly supplied to us by Major John Perry.

Inoculation of Plates.

The blood-agar plates were dried in the incubator at 37° C. for one hour. Four cultures were tested on each plate in areas marked off with grease pencil. The inoculations were made from eighteen-hour broth cultures with a small loop of number 30 gauge platinum wire over the available medium, the bulk of the inoculum being left in one area; the loop was then stroked over the remaining surface to give single colonies. Throughout the series we have used 20% horse-serum in broth as the culture medium, as many of the strains were revived from the dried state. The only disadvantage of using a serum-broth culture instead of plain broth is that, where the inoculum is heaviest, there may appear with many cultures a small area of hæmolysis due to transferred serum-streptolysin, although there is no visible growth. This area of hæmolysis has no significance in these tests and can be disregarded when the results are being read.

Reading of Results.

The plates were examined after eighteen to twenty-four hours' incubation at 37° C. for evidence of colony growth, and the degrees of growth from "+++" (equal to the control plate) to "–" were recorded.

In some tests the incubation was continued for forty-eight to seventy-two hours. It was found, (i) that when growth was absent at eighteen hours it did not appear on subsequent incubation, and (ii) that when growth was visible at eighteen hours, both growth and hæmolysis increased on further incubation.

Stability of Penicillin in Blood-Agar Plates.

Blood-agar plates containing one-twentieth of a unit of penicillin per millilitre showed no detectable deterioration after storage at 5° C. for twenty-one days or at room temperature (approximately 20° C.) for seven days. Throughout this survey we have used penicillin-blood-agar plates which had been prepared on the day prior to the tests and which had been stored overnight at 5° C.

Results.

On the basis of preliminary sensitivity tests on penicillin-blood-agar plates made with representative cultures of streptococci of groups A to H and the control strains, different concentrations of penicillin for the various groups of streptococci were chosen when the collection of strains was being tested. The sensitivity of the various groups of streptococci together with the number of strains tested and the source of the strains are shown in Table I.

Most strains had been isolated prior to the advent of penicillin treatment, but a few strains which, on being tested, did not differ in penicillin sensitivity from other members of the same group, were isolated during penicillin treatment. These strains were mostly of group A, from human sources (war wounds) and of group B, from bovine sources (mastitis).

[1] Since preparing this paper for publication we have noticed that Cowan (1945) has reported using a similar technique for testing the penicillin sensitivity of staphylococci.

TABLE I.

Results of Tests of Growth of Streptococci on Blood-Agar Containing Varied Quantities of Penicillin.

Streptococcus Group.	Source.	Number of Strains Tested. (Total 721.)	Units of Penicillin per Millilitre.							
			0	1/40	1/20	1/10	1/5	1·0	2·5	5·0
A	Human ..	288	+++[1]	−[1]	−					
C	Human ..	118	+++	−	−					
C	Equine ..	12	+++	−	−					
G	Human ..	72	+++	−	−					
H	Human ..	1	+++	−	−					
B	Human ..	102	+++		++[1] to −	+ to −	−			
B	Bovine ..	120	+++		++ to −	+ to −	−			
E	Milk ..	2	+++		+[1]	±[1]	−			
F	Human ..	1	+++		+	±	−			
D	Human ..	4	+++		+++	+++	+++	+++	+	−
	Cheese ..	1	+++		+++	+++	+++	+++	+	−

[1] "+++" means normal growth; "++" means growth with slight inhibition; "+" means growth with considerable inhibition; "±" means a trace of growth only; "−" means no growth.

In all, 721 strains of streptococci of groups A to H were tested for penicillin sensitivity.

It was found (Table I) that all streptococci of groups A, C (human and equine) and G were sensitive to penicillin, and that growth was uniformly inhibited on blood-agar plates containing one-fortieth of a unit of penicillin per millilitre. When plates containing one-eightieth of a unit of penicillin per millilitre were used, as was done with a small series of representative strains, variations in sensitivity were detected, some strains being completely and the rest partially inhibited.

Streptococci of group B from human and bovine sources were all sensitive to penicillin, but less so than strains of groups A, C and G. They varied slightly in their penicillin sensitivity, but the growth of all was inhibited by one-fifth of a unit of penicillin per millilitre, and that of most by one-tenth of a unit.

One representative strain of group H behaved as did those of groups A, C and G.

Streptococci of groups E and F (three only were tested) were sensitive to penicillin, but less so than those of groups A, C and G, and their sensitivity was of the same order as in group B.

Streptococci of group D (not pathogens, as indicated by the source) of human origin, and one from cheese, were resistant to penicillin as compared with strains of streptococci from other groups. The group D strains were completely resistant to 1·0 unit of penicilin and partially resistant to 2·5 units, but growth was inhibited by 5·0 units of penicillin per millilitre. In a large collection of streptococci from pathogenic conditions, previously isolated in this laboratory, no strain of group D which could be regarded as the causal organism of the condition was encountered. Wheeler and Foley (1943), however, report that they isolated nine strains of group D streptococci from human sources amongst several thousand strains of hæmolytic streptococci, and that six strains were associated with fatal cases of peritonitis, septicæmia, meningitis and subacute bacterial endocarditis. Fleming (1929) tested 11 strains of *Streptococcus fæcalis* and found them to be resistant to penicillin. Bornstein (1940) tested 27 strains of enterococci for penicillin sensitivity, and all were resistant. These strains were classified as *Streptococcus fæcalis*, *Streptococcus liquefaciens*, *Streptococcus zymogenes* and *Streptococcus durans*, and according to Sherman (1937), members of these species would fall into Lancefield's group D. Group D strains (a few were tested) have also been shown to be highly resistant to sulphathiazole (Long and Bliss, 1940; Hamilton and Hamilton, 1944). The test strain of the last-mentioned workers was the Lancefield group D strain isolated from cheese. On the basis of penicillin tests, the group D strains from human sources and cheese, and strains of the species classed as enterococci, behave in an identical manner. This evidence, in addition to that of heat resistance and other known physiological characteristics, supports the contention that enterococci are of group D or are closely related streptococci.

Summary.

1. Streptococci (721 strains), mostly from human sources, of groups A to H, have been tested for penicillin sensitivity by a simple penicillin-blood-agar plate technique. Strains of groups A, C, G and H from human sources were all sensitive to penicillin, growth being uniformly inhibited on blood-agar plates containing one-fortieth of a unit of penicillin per millilitre. Representative strains of the serological types of equine streptococci (group C) behaved as did those of group C from human sources. Streptococci of group B from human and bovine sources were all sensitive to penicillin, but less so than those of group A. They varied slightly in their penicillin sensitivity, but the growth of all was inhibited by one-fifth of a unit of penicillin per millilitre, and that of most by one-tenth of a unit per millilitre. Streptococci of groups E and F were of the same order of sensitivity as those of group B. Group D streptococci were resistant to penicillin when compared with strains from other groups. They were partially resistant to 2·5 units of penicillin per millilitre.

2. The penicillin used throughout the present survey was the calcium salt of penicillin II. A few tests were made using penicillin I and penicillin III, and the results obtained did not differ from those found with penicillin II.

3. The method for preparing penicillin-blood-agar plates is described. It was found that these plates showed no detectable deterioration after storage for twenty-one days at 5° C. or seven days at 20° C.

4. This method of testing for penicillin sensitivity is simple, and could be used in any laboratory as a routine test.

Acknowledgements.

We are grateful to Major P. L. Bazeley, O.B.E., and Mrs. S. E. R. Baldwin, of these laboratories; to Mr. E. Munch-Petersen and Mr. D. Murnane, of the Council for Scientific and Industrial Research; to Dr. Hilda Gardner, of the Royal Melbourne Hospital; and to Major John Perry for their cooperation; and also to Mrs. Margaret Green and Miss Barbara Parkin, B.Sc., for their assistance during this survey.

Bibliography.

E. P. Abraham, E. Chain, C. M. Fletcher, A. D. Gardner, N. G. Heatley, M. A. Jennings and H. W. Florey: "Further Observations on Penicillin", *The Lancet*, Volume II, 1941, page 177.

P. L. Bazeley and J. Battle: "Studies with Equine Streptococci. I. A Survey of Beta-Hæmolytic Streptococci in Equine Infections", *The Australian Veterinary Journal*, August, 1940, page 140.

S. Bornstein: "Action of Penicillin on Enterococci and other Streptococci", *The Journal of Bacteriology*, Volume XXXIX, 1940, page 383.

S. T. Cowan: "The Variation in Sensitivity to Penicillin of Strains of the Oxford Staphylococcus H", *The Journal of Pathology and Bacteriology*, Volume LVII, January, 1945, page 145.

M. H. Dawson, G. L. Hobby and M. O. Lipman: "Penicillin Sensitivity of Strains of Non-Hemolytic Streptococci Isolated from Cases of Subacute Bacterial Endocarditis", *Proceedings of the Society for Experimental Biology and Medicine*, Volume LVI, June, 1944, page 101.

A. Fleming: "On the Antibacterial Action of Cultures of a Penicillium, with Special Reference to their Use in the Isolation of B. Influenzæ", *The British Journal of Experimental Pathology*, Volume X, 1929, page 226.

F. Griffith: "The Serological Classification of Streptococcus Pyogenes", *The Journal of Hygiene*, Volume XXXIV, 1934, page 542.

T. R. Hamilton and B. W. Hamilton: "Pathology and Bacteriology of Streptococcus Endocarditis in Relationship to Sulfonamide Chemotherapy", *American Journal of Clinical Pathology*, Volume XIV, October, 1944, page 495.

G. L. Hobby, K. Meyer and E. Chaffee: "Activity of Penicillin 'in Vitro'", *Proceedings of the Society for Experimental Biology and Medicine*, Volume L, 1942, page 277.

E. V. Keogh, R. T. Simmons and H. Wilson: "Streptococcus Pyogenes (Group A): A Review of 1,341 Strains Collected from Human Sources", *The Australian Journal of Experimental Biology and Medical Science*, Volume XIX, 1941, page 51.

P. H. Long and E. A. Bliss: "Bacteriostatic Effects of Sulfathiazole upon Various Micro-Organisms. Its Therapeutic Effects in Experimental Pneumococcal Infections", *Proceedings of the Society for Experimental Biology and Medicine*, Volume XLIII, 1940, page 324.

C. M. McKee, G. Rake and A. E. O. Menzel: "Studies on Penicillin. I. Production and Antibiotic Activity", *The Journal of Immunology*, Volume XLVIII, April, 1944, page 259.

C. H. Rammelkamp: "A Method for Determining the Concentration of Penicillin in Body Fluids and Exudates", *Proceedings of the Society for Experimental Biology and Medicine*, Volume LI, 1942, page 95.

B. K. Rank: "Use and Abuse of Local Antiseptics on Wounds", THE MEDICAL JOURNAL OF AUSTRALIA, December 16, 1944, page 629.

G. V. Rudd, C. White and H. K. Ward: "Studies on Hæmolytic Streptococci from Human Sources", *The Australian Journal of Experimental Biology and Medical Science*, Volume XVII, 1939, page 25.

J. M. Sherman: "The Streptococci", *Bacteriological Reviews*, Volume I, 1937, page 3.

R. T. Simmons and E. V. Keogh: "Physiological Characters and Serological Types of Hæmolytic Streptococci of Groups B, C and G from Human Sources", *The Australian Journal of Experimental Biology and Medical Science*, Volume XVIII, 1940, page 151.

A. W. Stableforth: "Serological Types of Str. Agalactiæ (Streptococcus Group B) in this and other Countries", *The Journal of Pathology and Bacteriology*, Volume XLV, 1937, page 263.

R. F. Watson: "Sensitivity of Various Serological (Lancefield) Groups of Streptococci to Penicillin", *Proceedings of the Society for Experimental Biology and Medicine*, Volume LVII, 1944, page 66.

S. M. Wheeler and G. E. Foley: "A Note on Non-Group A Streptococci Associated with Human Infection", *The Journal of Bacteriology*, Volume XLVI, 1943, page 391.

FRACTURES OF THE CARPAL SCAPHOID.

By J. R. BARBOUR,
Major, Australian Army Medical Corps.

THIS paper is a general summary of the subject of fractures of the carpal scaphoid, and a review of 124 cases dealt with at a military hospital in the three years preceding March, 1945. The subject is worth some time and trouble, because these fractures are common in the Army age group and mode of life, and they are a real source of time loss and invalidity.

Anatomy of Bone and Fractures.

The scaphoid is the longest bone in the carpus and the only one not roughly cuboidal. It is slender for its length and takes a place in both the proximal and distal rows of carpal bones. The proximal half is cupped into the lower end of the radius by the head of the capitate. The distal half projects past the radial styloid towards the thumb, where the tubercle forms part of the solid butt of the thenar eminence. In a fall on the palm of the outstretched hand, the strong forearm muscles of the young adult hold the wrist rigid, and the thrust, travelling up through the capitate and tubercle of the scaphoid, cracks the latter across the edge of the radius like a stick across one's knee.

The site of the fracture of the bone depends on the position of the wrist and direction of the force at the time of impact. If the force continues after the fracture, it may cause a backward dislocation of the wrist, leaving half the scaphoid and the lunate still grasped in the lower end of the radius—the trans-scaphoid perilunar dislocation. In older people and in women Colles's fractures occur instead, because the wrist hyperextends and the lower end of the radius takes the stress. Examination of dissected specimens, with the softened ligaments still in place, makes the mechanism of these fractures apparent.

The long axis of the scaphoid bone is oblique to both axes of the wrist. If the elbow rests on the table and the forearm is elevated to 45° and the hand supinated until the plane of the palm is at 40° to the table, then the long axis of the scaphoid extends vertically through the tubercle.[1] Because of its position, the bone is subjected to shearing strains in abduction and adduction of the wrist and to screwing strains in flexion and extension. Hence a fracture line across the bone is continually subjected to strain, and it is doubtful whether any fracture of this bone unites without fixation, except fractures involving the tubercle. Subjects with untreated fractures usually report because of the persistence of pain and stiffness after injury, or because of the development of arthritis following non-union. Some fractures are discovered accidentally, and several in the present series came under notice because of wounds or fractures in the vicinity. I cannot say what proportion of ununited fractures fail to cause symptoms, but some appear to stay quiescent, perhaps as a result of fibrous union. However, we must regard the sequence of results in the case of untreated fractures as fracture, non-union and arthritis.

Blood Supply.

The blood supply of the bone is an important factor. It was known that in some cases a dense proximal fragment was seen in the X-ray films, as if this fragment did not take part in the decalcification of the carpus. In 1938 two Americans, Obletz and Halbstein, examined the vascular foramina of 297 scaphoids.[2] These foramina can occur only on the narrow palmar and dorsal surfaces of the bone. In 13% of these they found no foramina proximal to the waist. That meant that in this 13%, fractures of the proximal pole would deprive that pole of its blood supply. Furthermore, waist fractures damaging or just proximal to the vascular foramina would cause avascularity of the proximal half.

It was not surprising that these fractures were slow to unite, though eventually union occurred and the proximal fragment was revascularized. But it was held that, in spite of union, these fractures were attended by a high incidence of arthritis, said to be due to necrosis of the bone and articular cartilage. Hence the slow union was not only of no use, but a disadvantage which could be obviated by early excision of the necrosed fragment before joint damage occurred.[3] It was further held that follow-up of patients who had undergone early excision revealed greatly improved results.

An opposing view is that excision is indicated only when positive X-ray evidence is available of non-union and necrosis, as shown by creeping substitution with irregular mottled density and partial collapse.[4] This view depends on the following observations. The hyperæmic phase following fracture, during which the bones decalcify, was found to be confined to the first two or at the most three weeks. Now cartilage and cancellous bone in a graft are said to survive for three weeks while a new blood supply grows into them. If a fractured scaphoid with an avascular proximal fragment is fixed immediately, it is considered that a new blood supply can grow into the proximal portion from the distal in less than three weeks. However, this occupies the "hyperæmic phase", so that by the time circulation is again occurring in the proximal fragment, the decalcification has ceased and this fragment will remain denser than the rest of the carpus, although it is not necrotic. Brailsford declares that "the temporary retention of calcium by a fragment of bone does not

indicate that the fragment is necrotic, it may fuse without any of the secondary changes characteristic of necrotic bone".

Here are two diverse views on a subject which my own experience cannot elucidate at all, because I have not followed sufficient patients for long enough to know the later results. I intend to use conservative measures until convinced of inferior results.

Diagnosis.

Neither clinical examination nor negative X-ray findings immediately after injury can exclude a fracture of the scaphoid. Any person with an injured wrist who has tenderness over the region of the scaphoid and negative X-ray findings should report back for further X-ray examination in three weeks, to exclude a fracture. There is controversy about the number of views necessary for a radiological examination of the bone. Neither an anteroposterior nor a lateral view shows the full profile, so a half-oblique view is taken.

In most places these three views are considered sufficient. The present series includes three cases in which no radiological evidence of fracture was found immediately after injury, but the patients six months later reported with ununited fractures. However, reexamination of the early X-ray films reveals a tiny crack across the waist of the bone in one case.

It must not be forgotten that an injury may cause the onset of pain in the presence of an older fracture. Radiological signs should maks this condition apparent.

Treatment.

Early Treatment (within Two Months of Injury).

Early treatment consists of immediate, efficient and persistent fixation of the wrist by plaster of Paris until X-ray signs of fracture have disappeared. Fixation should be immediate, because the initial bone reaction should be the most potent force to bridge the gap, and it is possible that the life of an avascular proximal fragment depends on this early bridging. Fixation should be efficient, because the bone is so placed that it is peculiarly subject to strains on slight wrist movements with resultant refracture or persistent hyperæmia of the fracture site. Fixation should persist to obliteration of radiological signs of fracture, because absence of subperiosteal callus makes this the only true criterion of healing.

Before obliteration of the fracture, union by fibrous tissue will occur. Operation has been performed in cases in which no X-ray signs of union were apparent, and at operation the two halves of the bone have been found firmly adherent. Such a finding does not mean that operation is not necessary to obtain consolidation, though it may explain why some patients with ununited fractures remain symptomless in light occupations.

In 75 cases in which the fracture was treated within two months of injury, only two fractures did not unite; both these failures were due to inadequate treatment. One of the patients repeatedly broke his plaster cast during the first four months, and then "incomplete union" was found in spite of a further eight months' fixation. A year after discharge he reported with established non-union. In the other case wide separation and rotation of fragments were present, and a graft was performed after four months of fixation. Splinting was continued for another four months. Later this patient too reported with non-union. Apparently the graft had given a deceptive blurring of the fracture line, obscuring a persistent wide separation demanding much longer fixation. Yet both men have good function so far and are performing full duty. The non-union was discovered by a check X-ray examination, not because of symptoms.

The time necessary to secure union varied according to the site of fracture, the degree of separation of fragments and the incidence of avascularity of the proximal fragments (see Table I).

From these tabulated results one can see that the rise in time necessary to secure union varied directly with the degree of separation at the fracture site. It is also obvious that there was an all-round increase in time of union for proximal pole fractures compared to those through the waist of the bone.

I do not think the times of union are unusually long, but they may be. However, I believe that they are considerably longer than they should be. Half the patients were examined during the last year, when particular attention was given to splinting, and in these an average reduction in the time of splinting before union was achieved was obvious. Having seen the extraordinary variety of broken-down plaster casts arriving with patients in transit, I was stirred to apply at least a local remedy, and I believe it is showing dividends. "Plastering" may appear an adult form of amusement: but unless it is also a practised,

TABLE I.

Showing Time of Union in Relation to Site and Type of Fracture.

Site and Type of Fracture.	Number of Cases.	Average Time in Plaster Cast. (Weeks.)	Results.	Medical Category in Service.
Tubercle	5	15	All united.	One temporarily "B".
Waist:				
Cracks	20	15	All united.	No change.
Separations	31	28	Thirty united.	Eight "B" and one "D".
			One ununited.	"A."
Dislocations	2	26	One united.	"A."
			One ununited.	Temporarily "B".
Avascular proximal fragment (included above)	4	50	All united.	No change.
Proximal pole:				
Cracks	3	22	All united.	No change.
Separations	3	30	All united.	Two temporarily "B".
Dislocation	1	47	All united.	"B."
Avascular proximal fragment (included above)	2	41	All united.	Two "B".

TABLE II.

Showing Number of Fractures Uniting in Each Month of Treatment.

Type of Fracture.	Months of Treatment.								
	Two.	Three.	Four.	Five.	Six.	Seven.	Eight.	Nine.	Over Nine.
Tubercle (5)	1	2		2					
Waist (50)	7	5	9	3	7	7	4	3	5
Proximal pole (7)	1				2	1	1	1	1

reasoned procedure, it is unreliable. It is a mistake of the first order to say "anyone" can put on a plaster cast; "anyone" would probably perform an appendicectomy much better.

Late Treatment (more than Two Months after Injury).

Some of the patients examined later were merely suffering from delayed union, and reported because of persistent pain after injury. It is interesting that in two cases in which plaster fixation was begun nine months after injury, union was obtained in thirty-six weeks. Other patients reported because of the development of arthritis, one as long as ten years after a remembered "sprain", and in many of these cases the time of the injury had been forgotten. Three ununited fractures were found accidentally in X-ray pictures taken for other reasons, such as wounds of the forearm.

These cases present a variety of radiological changes. (*a*) Delayed union may occur, as shown by decalcification of the fracture line with areas of rarefaction—so-called cysts—along it. (*b*) Established non-union with considerable absorption of bone and sclerosis along the fracture line may be present. Undoubtedly some of the reported cases of bipartite scaphoid have been cases of non-union, the dense, eburnated surfaces making a false joint. (*c*) Arthritic changes may be present, varying from a mere sharpening of the radial styloid to an apparent narrowing of the radio-scaphoid joint space. I have seen no spread of arthritic changes through the neighbouring carpal joints.

The treatment in cases of delayed union is fixation in a plaster cast without operation. The analysis shown in Table III will indicate this. It is wrong to presume that operation was performed in the worst cases. A close examination of records and X-ray films has shown that it would be more correct to consider that the cases in which operation was undertaken were a cross-section of these "delayed union" cases. Operation was not undertaken after prolonged fixation had failed to secure union.

The most striking feature of Table III is the time required to secure union—an average of twenty-five weeks, which is similar to the times stated in Table I. It would seem to suggest that delay in treatment up to nine months does not greatly affect the time taken by the fracture to unite. Another interesting feature is that some delay in treatment has exposed these patients to a high operation rate with poor results.

From this review it seems that one may expect few patients with delayed union to have much chance of cure after nine months without treatment. Among 32 cases, only three were selected for plaster fixation and none of these fractures united. The treatment of patients reporting after nine months' delay would appear to be allocation to lighter work and fitting of a moulded leather support. This support is laced on and extends for three inches above and one inch below the radial styloid, being held in position by a strap between the thumb and forefinger. Its power to relieve a weak, aching wrist is surprising. Operation, unless for arthrodesis, is of no value in the presence of arthritis. Table IV shows the results of various forms of treatment in 32 cases. Again, operation is not an index of severity in this series.

Arthritis is an actual or potential complication of all fractures of the scaphoid, but particularly so in cases in which treatment is delayed for months. If X-ray examination reveals delayed union with early arthritis, it is reasonable to seek union by fixation in a plaster cast, because all symptoms may be due to lack of union.

However, a combination of non-union and arthritis is a different problem. Operation and lengthy fixation in a plaster cast are the only chance of securing union—and a very uncertain chance it is. Should the measure succeed and symptoms persist because of the arthritis, the patient has not benefited at all. Excision of the proximal fragment has been used to mitigate the non-union and arthritis. My results after excision indicate persistent disability and discharge of the patient from the service as medically unfit.

Hence I consider that delayed union with arthritis should be treated by fixation in a plaster cast to secure union. But arthritis with non-union should be treated by a change to lighter work and if necessary the fitting of a leather support.

Conservative Treatment.

The conservative method of seeking union is by the application of a plaster cast. I shall describe the method as used at this hospital.

To prevent skin irritation the forearm and hand are first covered with zinc cream containing 10% *Liquor Picis Carbonis*. Then the point of the elbow is rested on the table, the hand being raised and the palm in the vertical plane. The natural tendency is to hold the hand supinated, and if the cast is applied in this position pressure occurs on the ulnar styloid on pronation of the hand for ordinary use. A plaster slab is placed along the radial border of the forearm and wrapped about the thumb to extend just distal to the metacarpo-phalangeal joint. The bandages are wrapped round from the upper part of the forearm to just below the metacarpal heads dorsally and the distal palmar crease ventrally. A wad of bandage is gathered into the palm to make a thick "buffer" here. The lower edge of the cast is moulded back until the distal palmar crease and metacarpal heads just show. By this means a "thick-ended" plaster is produced with the full thickness vertical to the skin surface. When the plaster is just setting the patient opposes the tip of his thumb and forefinger, and the surgeon holds the dorsal and palmar surfaces together with a gentle pressure. When the plaster has dried, to coat it with shellac and place a strip of leather across the palm make it more durable.

The advantages of this type of cast are many. The ointment minimizes skin troubles. The slab allows selective strength, while there is a thin portion along the ulnar

TABLE IV.

Showing Treatment and Results in Thirty-two Cases after a Delay of More than Nine Months.

Fractures Treated or Untreated.	Number of Cases.	Results.	Medical Category in Service Later.
Untreated (includes leather splints) ..	23	—	3 "A", 13 "B", 7 "D".
Treated	9	Non-union.	3 "B", 6 "D".
Plaster cast only 3	—	—	1 "B", 2 "D".
Operation .. 6	—	—	2 "B", 4 "D".
Graft .. 3	—	—	2 "B", 1 "D".
Excision of proximal fragment 3	—	—	3 "D".

TABLE III.

Showing Results of Treatment in Seventeen Cases of Delayed Union, Treatment having been Given from Two to Nine Months after Injury.

Mode of Treatment.	Number of Cases.	Average Time After Injury. (Months.)	Average Time for Union. (Weeks.)	Result.	Medical Category.
Plaster cast only	10	5·5	25	Union in all.	5 "A", 4 "B", 1 "D".
Operation	7	4·5	—	Non-union in all.	3 "A", 1 "B", 3 "D".
Graft	1	—	—	—	"A."
Drilling	3	—	—	—	2 "A", 1 "D".
Excision of proximal fragment	3	—	—	—	1 "B", 2 "D".

side for easy removal. The thick, square lower ends prevent a gradual loosening by fraying, and the mass in the palm is too thick to be softened in ordinary use. In practice this cast regularly lasts a month, being as efficient at the end of that time as when new.

Some writers advocate metal splints,[5] others use cellulose casts. Some do not immobilize the first metacarpal at all and claim to obtain good results.[6] However, the commonest method is still the use of plaster of Paris, and the results are satisfactory with careful supervision. The necessity of changing the cast, and its liability to loosening, both add an extra risk of damage to the healing fracture. One cannot be too careful in removing plaster casts and handling the limb while X-ray films are taken. Unguarded movement of the limb while out of its plaster cast places an early union in jeopardy.

Conduct of a Case.

The man may and should do light work, but must keep the plaster dry. He must be constantly watched for loosening of the cast. It seems unsatisfactory to treat patients at their units, even if they are reporting every week.

The plaster cast should not need changing more than once a month, but it must be changed immediately any loosening occurs. In many cases it is sufficient to have X-ray films taken every two months, though a monthly check is desirable. When the fracture is considered healed and the plaster cast is finally removed, the man should report back in three weeks' time for a check X-ray picture. This precaution is made necessary by the difficulty of interpreting X-ray films taken with a slight variation of angle. One picture may give a perfect view of the fracture line and show incomplete healing; a month later a picture at a slightly different angle may suggest that obliteration of the line is almost complete. So the cast is removed and active use of the limb encouraged. Usually the healing process will continue to completion; but occasionally the unduly favourable appearance from a picture taken obliquely across the fracture line will lead to too early mobilization followed by rarefaction, and if this is undetected, it may result in non-union. Three such cases occurred in the present series.

Sometimes during the course of treatment X-ray films show the fracture line obscured in part of its extent, the appearances suggesting that union is occurring, but no appreciable change in the appearance takes place for several months. That is, delay in union occurs during the fixation of the fracture. I consider this is really delay in calcification.

The commonest cause is undoubtedly that the plaster casts are allowing sufficient movement to keep the fracture hyperæmic. If this cause can be excluded, then either a skin infection or the mild atrophy which sometimes occurs under plaster, may delay calcification. It is worth while removing the cast and allowing light use of the hand for two weeks. Another X-ray film then will probably reveal increasing union, but if not, the plaster cast should be reapplied. I chanced on this apparently dangerous practice some time ago. A certain waist fracture remained in a state of delayed union for four months. It was then decided to graft the fracture, and so the plaster cast was removed. A mild folliculitis was present, and it was a month before the skin was quite clear and ready for operation. A check X-ray film then showed that consolidation was complete and operation quite unwarranted. I have tried the above course several times since then, and on each occasion rapid consolidation of the fracture has followed. Though this procedure should be used with caution, I now believe it should always be carried out before an operation is performed for delayed union occurring during fixation in a plaster splint.

The union of a fracture of the scaphoid is not always the end of the treatment. It is not always accompanied by a free and painless wrist joint, and successful treatment cannot be claimed on the score of union alone. The man may still need a change to lighter work or a leather support because of early arthritis precipitated by the original injury.

In most cases natural use will restore full movement within two weeks of the removal of the plaster splint. However, on two occasions in the present series the wrist was manipulated under anæsthesia to break down persistent adhesions.

Operative Treatment.

Operative treatment consists of methods to secure union, such as drilling, grafting or fixation by a screw, and excision of part or the whole of the bone to prevent or alleviate arthritis.

Excision is the oldest procedure, and as late as 1944 an article appeared advocating early total excision as the treatment of choice for many fractures.[7] I have had no experience of this, nor of the latest modification, total excision and replacement by a ready-made vitallium replica. I cannot believe that either is necessary. Early excision of an avascular proximal fragment is advocated by Watson-Jones. My own observation, admittedly over a short period, shows satisfactory results after union has been secured by fixation in a plaster splint. Late excision of a proximal fragment in non-union was performed six times in the present series; the shortest time after injury was seven months. Five of the six patients were discharged from the service soon after operation, and one remains on light duty (B class). I cannot believe that this procedure is worth while.

Drilling is employed to break down the sclerosed edges in non-union or fibrous union, and then a fresh attempt at union is permitted in a plaster splint again. In the present series drilling was apparently done to expedite the consolidation of delayed union. Table V shows that it was performed five times, and the interval after fracture varied from three to twelve months. Three fractures united and two did not. I consider that drilling alone has little to recommend it. The introduction of a graft as internal fixation to assist the plaster fixation would appear better.

Grafting can be performed in two ways. The older method is to cut down on the bone and expose the fracture site as well as the tubercle. The blood supply to the bone, which is provided by the neighbouring soft tissues, may be considerably damaged by this technique. By a more recent method the graft is introduced through a tiny incision over the tubercle. The hand is placed in a rest holding it at 40° off full supination and the forearm at 45° to the horizontal. The long axis of the scaphoid is now vertical, and a drill can be introduced in this plane. The progress is checked by X-ray films and then a graft is driven along the drill hole.[8] [9] The operations in this series were performed by the older method, and the grafts were taken from the tibia or the lower end of the radius. Of six fractures, only two united. Two failures were caused by too early removal of the plaster cast, when the drilling and graft caused a deceptive blurring of the fracture line. Later, rarefaction and non-union occurred. Therefore fixation must be continued for long enough to allow such a period to pass—apparently for at least four months after operation.

A third type of operation is being used elsewhere in cases of delayed union. A bone screw, to secure apposition and internal fixation without the use of plaster, is inserted into the fragments. I have no experience of this method of treatment.

The summarizing of these results gives a rather depressing picture. Operative attempts to secure union in seven cases of delayed union succeeded in four instances, possibly five. In four cases of non-union, all attempts failed. Six excisions of proximal fragments resulted in the discharge as medically unfit of five of the patients. It is interesting that in some cases in which operation was performed for delayed union, the fragments were found firmly adherent across the fracture line. One may presume that these were either cases of fibrous union, or more probably, cases of delayed calcification of a united fracture.

The Indications for Operation.—In many of the cases in which operation was performed in the present series, I con-

TABLE V.
Showing Operations and Results in Seventeen Cases.

Operation.	Type of Fracture at Operation.	Delay Before Treatment.	Length of Plaster Fixation.		Result.	Medical Class.
			Before Operation.	After Operation.		
Excision of proximal fragment.	Waist:					
	Non-union and arthritis	30 months.	—	—	—	D
	Non-union, arthritis, avascular proximal fragment	18 months.	—	—	—	D
	Non-union, avascular proximal fragment	9 months.	5 months.	—	—	D
	Non-union and arthritis	Years.	—	—	—	D
	Proximal pole:					
	Non-union, with avascular proximal fragment	4 months.	3 months.	—	—	B
	Non-union, rarefaction of proximal fragment	2 months.	6 months.	—	—	D
Drilling	Waist:					
	Delayed union, avascular proximal fragment	—	12 months.	4 months.	Union.	D (multiple fracture)
	Delayed union (distal)	6 weeks.	5 months.	1 month.	Union.	A
	Non-union	6 months.	—	4 months.	Non-union.	D
	Delayed union	6 months.	—	6 months.	Non-union.	A
	Proximal pole. Delayed union	3 months.	—	12 months.	Union.	A
Grafting	Waist:					
	Non-union and avascular proximal fragment	12 months.	5 months.	6 months.	Non-union.	D
	Delayed union, avascular proximal fragment	—	4 months.	4 months.	Union.	B
	Delayed union, rotation fragment	—	3 months.	3 months.	Non-union.	B
	Delayed union	3 months.	—	3 months.	? Union.	A
	Proximal pole:					
	Non-union and arthritis	36 months.	—	9 months.	Non-union.	B
	Non-union and avascular proximal fragment	11 months.	—	3 months.	Non-union.	B

sider operation was either unnecessary or of doubtful assistance. This review has convinced me that the indications for operation are few. Non-union without arthritis is an indication, as union may prevent later degeneration of the joints. But patients presenting with non-union may be presumed to have arthritis unless they present in one of three ways: (*a*) if non-union has developed during treatment, or (*b*) if persistent pain after injury has led to their reporting for treatment, or (*c*) if a fresh injury leads to the detection of non-union before arthritis has begun. It seems wrong to seek union in the presence of arthritis which one would expect to be progressive. So I regard operation for union as prophylactic and not a palliative for arthritis. If I was asked how successful operation was in the presence of non-union, I could only give a pessimistic answer. Delayed union is the commonest indication for operation. I wonder whether it is not erroneous, though I previously regarded persistent delay in union during fixation in plaster as the chief reason for operative assistance to union. Now I would regard these cases as due to delay in calcification rather than as due to a failure in union. I have explained how I treat such fractures in the discussion under the heading "The Conduct of the Cases". If the removal of the plaster cast and the clearing of skin infection do not result in improvement within six weeks, then a graft should be placed across the fracture line and fixation in a plaster splint continued for at least four months. I do not consider that the X-ray appearance of early arthritis in delayed union should stop one from attempting to obtain union of the fracture.

Early excision of an avascular proximal fragment I regard as an operation of doubtful value, and prefer to wait for true signs of necrosis and non-union. These signs were quoted earlier as "positive X-ray evidence of non-union and creeping substitution with irregular mottled density and partial collapse". Crippling arthritis not relieved by a moulded leather support is an indication for radio-carpal arthrodesis. The indication for operation may be stated therefore as follows: (i) non-union without arthritis; (ii) delayed union persisting after conservative measures have failed to overcome it; (iii) non-union with established evidence of a necrotic proximal fragment; and (iv) crippling arthritis.

Conclusions.

1. Scaphoid fractures have a strong tendency to unite if fixation is continued long enough. This observation is supported by the high proportion of union in all cases in which early treatment is given, and the union obtained even after delay for as long as nine months. It appears that the failures can be attributed to inadequate treatment.

2. In the absence of established non-union, two factors only would appear to prevent union: (i) inadequate treatment; (ii) operative interference. Separation, comminution, rotation and avascularity of fragments do not stop union, though they cause it to be slow, and may produce arthritis and a poor result.

3. The rate of healing has been shown to be affected by the site of fracture, the degree of separation of fragments and the condition of the blood supply to the proximal fragment. I am sure that the maintenance of adequate fixation is another factor.

4. Delay in treatment up to nine months has not affected the rate of healing or the result. This I consider the most surprising fact revealed in this analysis of results.

5. Persistent delay in completion of healing during fixation in plaster of Paris may be due to delay in calcification of the united fragments for various causes.

6. Non-union can be associated with a negligible disability and union with sufficient disability to lead to discharge of the patient from the service. In view of this observation and of the results of operation to secure union, it seems that operation was of little if any assistance in the present series; it was probably the reverse. Excision used to mitigate old non-union and arthritis resulted in only one man's remaining in the service, and he on permanent light duty.

7. Better results would have followed (*a*) a higher standard of plaster cast; (*b*) closer supervision, especially during change of plaster casts; (*c*) the substitution of prolonged fixation for operation in all cases of delayed union; (*d*) the use of moulded leather splints instead of operation for non-union with arthritis. It is recognized that the use of the service medical grading as an estimation of results is poor compared with a personal review of the cases.

Acknowledgement.

I wish to thank the Director-General of Medical Services for permission to publish this paper.

References.

(1) J. R. Armstrong: "Closed Technique for Fixation of Fractured Carpal Scaphoid", *The Lancet*, Volume I, April 26, 1941, page 537.

(2) B. E. Obletz and B. M. Halbstein: "Non-Union of Fractures of Carpal Navicular", *The Journal of Bone and Joint Surgery*, Volume XX, 1938, page 424.

[5] R. Watson-Jones: "Fractures and Joint Injuries", Third Edition, page 564.
[6] B. E. Obletz: "Fresh Fractures of Carpal Scaphoid", *Surgery, Gynecology and Obstetrics*, Volume LXXVIII, January, 1944, page 83.
[7] E. L. Farquharson: "Splint for Fracture of Carpal Navicular", *The Journal of Bone and Joint Surgery*, Volume XXIV, 1942, page 922.
[8] R. F. Jaekle and A. G. Clark: "Acute Fractures of Carpal Scaphoid", *Surgery, Gynecology and Obstetrics*, Volume LXVIII, April, 1939, page 820.
[9] M. G. Henry: "Fractures of Carpal Scaphoid Bone in Industry and in Military Service", *Archives of Surgery*, Volume XLVIII, April, 1944, page 278.
[10] A. A. Butler: "Bone Pegging Carpal Scaphoid", *Proceedings of the Royal Society of Medicine*, Volume XXXV, October, 1942, page 760.

PLACENTA PRÆVIA.[1]

By R. H. SYRED,
The Royal Hospital for Women, Sydney.

I SHOULD like to commence my paper on *placenta prævia* by stating that the general practitioner is wise not to examine his patient *per vaginam* unless she is in a well-equipped hospital with full facilities for treating hæmorrhage. Immediately any hæmorrhage is either reported or seen by the doctor, the patient should be transferred to hospital.

Emergency Treatment.

The importance of vaginal plugging as a first-aid treatment cannot be over-emphasized. The patient can be sent many miles to hospital after this first-aid treatment. The plugging is carried out after pubic toilet has been performed. The patient empties her bladder or it is catheterized. Cotton-wool pledgets are soaked in saline solution or 5% "Dettol" solution and thoroughly wrung out, and the vagina is systematically packed—posterior fornix, lateral fornices and anterior fornix in this order. The effect is mechanical and compresses the placenta against the uterine wall, fulfilling the general principle of compression of the bleeding point. As an alternative, the vagina may be packed with four-inch rolled gauze soaked in saline or "Dettol" solution, the gauze being packed firmly into the vagina as in the case of the wool pledgets. Iodoform gauze may also be employed, and I have known a patient who was admitted to hospital with her vagina packed with strips of sheeting, who subsequently had an uneventful convalescence.

Examination in Hospital.

On her admission to hospital everything is in readiness for the patient to be treated for shock. Blood typing and examination of the blood for the presence or absence of the Rh factor are carried out, and transfusion set and pooled human serum are ready for administration.

The initial vaginal examination should be carried out by the doctor fully gloved and gowned and with an assistant at hand to administer an anæsthetic if the need should arise. The following instruments should be sterilized and in readiness for use: (i) Auvard's self-retaining speculum; (ii) one pair of Willett's scalp traction forceps (full size); (iii) one pair of multitoothed tenaculum forceps; (iv) one roller bandage and a one-pound weight for axis retraction if necessary. The bed available should preferably be a Williams's bed, provided with a rod and pulley at the end for the necessary traction. Once the diagnosis has been confirmed, a decision must be made there and then whether the treatment is to be carried out *per vaginam* or by Cæsarean section.

At this point I should particularly like to say that expectant treatment is carried out only if the patient is at rest in bed in a large hospital under careful supervision. With this treatment the patient is not examined vaginally, but is kept in bed continually. Blood typing and examination for the Rh factor are carried out immediately. In my opinion this treatment is justifiable only in the case of an elderly *primipara* when the fœtus is bordering on viability. The general rule of "active treatment once the diagnosis is made" should be carried out.

Central Placenta Prævia.

The ideal treatment is Cæsarean section under general anæsthesia. The ideal conditions for Cæsarean section are as follows: (i) when viability of the child is assured—that is, the patient is approaching the thirty-sixth week of gestation; (ii) the patient's colour is good, her general condition is satisfactory, and only moderate vaginal hæmorrhage is present.

I should like to add that in the case of *multiparæ* it is best to avoid Cæsarean section, as the cervix is usually soft and dilates very easily. Patients unsuitable for Cæsarean section are those who are blanched and have lost a considerable amount of blood. Treatment of patients in this group is the immediate transfusion of serum and blood. If the os is dilated to admit one finger, then the vagina should be plugged or packed to control blood loss, and twenty-four hours later the packing should be removed. Frequently a *placenta prævia* which has been central is now found to be marginal with dilatation of the os to admit two fingers or more. Treatment then is by rupture of the membranes, and the application of Willett's scalp traction forceps if the head can be easily grasped and pushed into the pelvis. If the head is not readily accessible, then bipolar version should be performed and one-pound traction should be applied to the leg in a half-breech presentation. The half-breech presentation provides an extremely efficient wedge, it controls the blood loss and materially assists in the dilatation of the cervix. I may add that as the vagina is tightly packed, difficulty in voiding urine may occur and the patient may frequently require to be catheterized.

Against Cæsarean section it must always be remembered that the maternal mortality rate is raised by an additional 10% by the performance of this operation, and hence it is necessary to perform it in an efficient operating theatre with an efficient operating team. It must be remembered that serious complications can affect the patient's convalescence; among these are paralytic ileus, intestinal obstruction, post-partum hæmorrhage associated with obstetric shock, pulmonary embolus, pulmonary œdema. These are just some of the difficulties associated with convalescence.

In post-partum hæmorrhage following Cæsarean section, treatment, apart from the use of oxytocic drugs, is by further blood transfusion.

With regard to pulmonary embolism, I should like further to stress the fact that a patient should never be propped up with more than two pillows for the first forty-eight hours after operation, and that when Cæsarean section is performed for *placenta prævia* there is a great risk of pulmonary embolism in the first week of convalescence.

I should now like to quote the histories of two patients with central *placenta prævia* treated in hospital.

On her admission to hospital the patient had no vaginal bleeding, but gave a history of loss sufficient to soak two pads prior to her admission. A vaginal examination was carried out; the os was dilated to admit one finger and central *placenta prævia* was diagnosed. No hæmorrhage occurred immediately after the examination, but within twenty minutes copious hæmorrhage began, blood spurting from the vagina in a four-inch stream. The vagina was immediately packed with five rolls of four-inch gauze soaked in 5% "Dettol" solution, the hæmorrhage was immediately controlled and a transfusion of serum and blood was given. Within one hour the patient was perfectly well, her colour was good and her pulse rate was 80 per minute. As fœtal heart sounds were present, a classical Cæsarean section was performed, a further transfusion of blood being given on the operating table. Convalescence was uneventful. Sulphonamide drugs were given as a prophylactic measure. Unfortunately the infant died six hours later from anoxæmia.

The second patient was a *multipara*. Free hæmorrhage was occurring from the vagina. On examination of the patient

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on November 29, 1945.

the os was dilated to admit three fingers, and central *placenta prævia* was present, the head being high. A bipolar version was performed; traction was applied to the leg and the patient delivered herself in three hours of a living infant. The third stage was not delayed, and the patient had no post-partum hæmorrhage.

In the performance of bipolar version the placenta is pushed to one side, the head is pushed up and the back is found by the external hand; the breech is then pushed down into the pelvis.

In the treatment of post-partum hæmorrhage I should like to comment first of all on the use of cotton-wool pledgets. Frequently these dry into a hard mass and their removal can lacerate the vaginal mucosa. Secondly, *accouchement forcé* is to be deplored, as damage to the cervix will cause further shock to the patient and tend to produce post-partum hæmorrhage. The patient should expel the fœtus by her own unaided efforts. With regard to blood transfusion, if more than one litre of blood is given, then the patient's blood should be examined for the Rh factor and the appropriate type given. I have seen two patients die after being given Rh-positive blood, although the blood was compatible.

Marginal Placenta Prævia.

In the treatment of marginal *placenta prævia* vaginal plugging is necessary if the cervix is dilated only to admit one finger. If the cervix is dilated to admit two fingers or more, rupture of the membranes should be carried out if the head is easily accessible and can be pushed down into the pelvis. Willett's scalp traction forceps should be applied, or an efficient substitute is the multitoothed volsellum, which is ideally shaped and can grasp the scalp securely. One-pound traction is then applied; a greater weight will tear the instrument from the scalp.

The Champetier de Ribes bag is now of academic interest only. In the treatment of *placenta prævia*, if it is used, it must be carefully inserted through the cervix, and one must remember that if the bag slips down into the vagina it may conceal hæmorrhage behind it.

Lateral Placenta Prævia.

In the treatment of lateral *placenta prævia*, frequently rupture of the membranes is sufficient to control hæmorrhage. If this is not successful, then the application of Willett's scalp traction forceps, or version as in marginal *placenta prævia*, may be necessary.

Post-Partum Hæmorrhage.

In all cases of *placenta prævia* one must be careful to avoid any post-partum hæmorrhage; as the placenta is in the lower non-contractile portion of the uterus, and as the placenta has partially separated to cause the hæmorrhage of *placenta prævia*, it will be readily understood that the placenta may be retained and cause post-partum hæmorrhage. If the third stage is delayed at all, a speedy manual removal of the placenta should take place before the patient becomes exsanguinated.

Sepsis.

Sulphonamide drugs should be administered to guard against any sepsis which may follow vaginal or uterine manipulation.

REPORT ON A SERIES OF CASES OF SINUSITIS TREATED BY CHEMOTHERAPY AT AN AUSTRALIAN GENERAL HOSPITAL.

By R. H. Bettington,
Major, Australian Army Medical Corps,
and
G. K. Vincent,
Major, Australian Army Medical Corps.

Sixty cases of sinusitis are here reported, five acute and 55 classed together as subacute or chronic. Our criterion of the designation subacute or chronic has been the performance of at least four proof punctures, without improvement in the patient's condition. The five acute cases are included because the patients were the first five with that type of sinusitis admitted to the hospital after we had decided on the experiment, and because they are amongst the 21 cases mentioned in the bacteriological report (Table I). A large number of acute infections of this type have been treated since, and the results obtained with sulphamerazine were so uniformly good that we included no more of them.

Bacteriological Findings.

The most striking points arising out of this survey are that in only one case (I) was there no pathogenic type of staphylococcus or streptococcus; in only four (I, XI,

Table I.
Bacteriological Findings.

Organisms Present.	Case Number.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Bacillus fæcalis alkaligenes																		x			
Bacillus aerogenes									x										x		
Bacillus coli communis									x	x		x					x			x	x
Bacillus coli anaerogenes					x																
Micrococcus catarrhalis			x																		
Hæmophilus influenzæ								x												x	
Bacillus anthracoides								x													
Bacillus pyocyaneus											x										
γ-streptococci												x									
Hæmolytic streptococci (group A)									x											x	
Staphylococcus albus					x		x						x								
Staphylococcus aureus (hæmolytic)		x	x	x	x	x	x	x	x	x		x		x		x	x	x	x		x
Staphylococcus aureus (non-hæmolytic)				x	x		x				x	x			x				x		
Streptococcus viridans	x		x						x	x				x		x					
Diphtheroids	x	x	x				x	x	x			x		x		x			x		

XIII, XV) was no hæmolytic organism found; and the hæmolytic *Staphylococcus aureus* was absent in only five cases. The pathogens mentioned are all sensitive to penicillin and sulphonamide drugs. It is possible that the other organisms found are either secondary invaders or normal inhabitants of the nose.

X-Ray Findings.

X-ray pictures were taken in nearly all cases, and the appearances varied from slight mucosal thickening to complete dulness. While this was a help in diagnosis, we found the results of no value in determining whether chemotherapy would be effective or not.

Chemotherapy.

The methods of treatment adopted are as follows. On their admission to hospital patients were given menthol inhalations and menthol and paraffin nasal drops as a routine measure. After four proof punctures the "Army B" course of sulphamerazine was given. This consists of 25 grammes in five days, the doses all being given at intervals of eight hours, as follows:

First day: two doses of 6·0 grammes and 3·0 grammes.
Second day: two doses of 3·0 grammes and 3·0 grammes.
Third day: two doses of 2·0 grammes and 2·0 grammes.
Fourth day: two doses of 2·0 grammes and 2·0 grammes.
Fifth day: two doses of 1·0 gramme and 1·0 gramme.

Sulphamerazine was given in nearly all cases owing to its availability. In a few cases only sulphadiazine was used, but not often enough for an opinion to be formed as to any relative advantage in using the latter.

Patients were put to bed entirely for the first three days of the course and allowed up for short intervals on the last two. They were required to take at least five pints of fluid a day and to keep their own fluid balance charts. The urine was tested at least three times a day so that it could be kept alkaline by requisite doses of potassium citrate or sodium citrate.

In only one case was it necessary to suspend treatment through the effect of the drug on the kidneys. This patient had had two similar courses in two months, both for acute exacerbations of a chronic sinusitis. The first course was of sulphamerazine and the second of sulphadiazine. On both occasions he complained of lumbar pain on the second day, his urinary output dropped rapidly and the urine became acid. Each course was suspended at once.

In a few cases in which the urinary output fell noticeably, one dose was postponed for twelve hours. It was never found necessary to do more than this.

Two or three days after the completion of the course the antra were proof-punctured again. If after another four proof punctures no improvement was found, then penicillin treatment was commenced. The method adopted was as follows. A proof puncture was performed, and after the saline irrigation had been completed, the cannula was left in place; 1·5 to 2·0 millilitres of penicillin solution were pushed in slowly with a small syringe every three hours, the patient lying with the affected side down and staying there for half an hour after each treatment. The strength of the solution varied between 50 units and 5,000 units per millilitre.[1]

At present we are using 500 units per millilitre and have found no advantage in using high concentrations.

The treatment was carried out every three hours for forty-eight hours; then the cannula was withdrawn, and another proof puncture was performed two days later.

Types of Cases.

In six of the cases the patients had previously undergone radical antrostomy on the affected side, and three of them required another radical operation owing to the closure of the intranasal openings and reinfection.

It has become our habit to give the above course of sulphamerazine in all cases of reinfection after radical antrostomy and as a post-operative treatment in all our own similar cases if the convalescence is at all slow.

In every case in which the drainage was good and the antral openings patent (a number of these are not recorded in the present series), the antra became perfectly clean in a short time. The subsequent history of our patients who have undergone radical operations shows that any tendency to a lengthy convalescence is brought to an abrupt stop by this procedure.

We found that the appearance of the antral lining, in the cases in which operation was ultimately performed, was unaltered by the chemotherapy. We judged this by our previous experience of patients operated on without preliminary chemical treatment.

Results.

Five patients suffering from acute sinusitis all recovered after the "Army B" course of sulphamerazine. Of 55 patients suffering from subacute or chronic sinusitis, 15 underwent radical antrostomy, 28 were cured after sulphamerazine treatment only, 10 recovered after penicillin treatment, and two are still under treatment. The two patients still under treatment have both had sulphamerazine and penicillin and their condition has improved; but still their antra are slightly infected. They have been advised to undergo operation, but prefer to postpone their decision for the present.

The 15 patients who underwent radical antrostomy all had long histories, and most of them had severe nasal polyposis.

Five patients had nasal polypi removed, and subsequent chemotherapy cleaned the antra entirely. Three patients required submucous resection of the septum as a preliminary.

In the cases in which the antra were clear after chemotherapy, further proof puncture was performed from one to two weeks after the regular treatment had been finished. In six cases this check was not carried out. Of the patients whose condition was so checked, four were found to have had a recurrence and all required additional chemotherapy. One of them eventually underwent a radical antrostomy. This patient was found at operation to have a large infected dental cyst in the incisor region, which communicated with the antrum and probably was the original cause of the antritis.

Difficulties and Dangers.

The administration of all sulphonamide drugs has an element of danger. Sulphamerazine has slight nauseating effects, but has a tendency to crystallize in the kidneys in acid urine. For this reason no patient should take large doses without being at rest and keeping a careful fluid balance chart and a record of urine reactions. This is difficult unless the patient is in hospital. Patients who have had a recent course of a sulphonamide drug are more likely to show toxic reactions, so every patient should be questioned closely about previous therapy and toxic effects.

There appear to be no dangers attached to the penicillin therapy, but it is awkward to have a cannula in the nose for forty-eight hours. This again makes it almost obligatory to keep the patient in hospital. In a number of cases in which the cannula became loose, we had to strap it to the cheek.

Conclusions.

1. The predominant infecting organism in acute, subacute and chronic sinusitis is the hæmolytic staphylococcus.

2. Modern chemotherapy in the form of sulphamerazine and locally applied penicillin is of great value in treating acute and subacute sinusitis.

3. Little benefit can be expected from the same treatment in chronic sinusitis when pronounced nasal and antral polyposis is present.

Acknowledgements.

We wish to thank Major G. C. Halliday and Major G. V. Rudd for their valuable help and cooperation. Major Rudd states that he handed the work over to Sister E. Ritchie, who was at that time attached to the pathology department. The Director-General of Medical Services has given permission for the publication of this paper.

Reference.

(1) L. P. Garrod: "Action of Penicillin on Bacteria", *British Medical Journal*, January 27, 1945, page 107.

AN ANALYSIS OF DEFORMITIES AMONG RECRUITS, WITH REMARKS ON SUB-STANDARD TYPES.

By W. E. ROBERTS,

Surgeon-Commander, Royal Australian Navy, Sydney.

THE requirements for the naval service are many and diverse. The majority of candidates examined were in their teens and destined for the seaman and stoker branches. The remainder were examined for writer, medical, supply and other branches. Some of the older applicants represented the engine-room artificer, shipwright and motor-mechanic branches.

In the series under review 2,090 recruits were examined, and the ages ranged from seventeen to thirty-five years, the greater number being in their teens; 1,010 were found to be unfit from all causes, and of these 306 were sub-standard or below naval physical standard, and a further 180 possessed some deformity. These deformities rendered them unfit for any branch of the service (see Figure I). With regard to those classed as sub-standard or below naval physical standard, it must be remembered that for the seaman branch of this service a high standard is required.

The principle of acceptance is whether the prospective recruit will meet the requirements necessary to make him an efficient ordinary seaman. On this, if there is no demonstrable disability, and provided that weight, height and chest development (mean) are average and that the muscle tone is good, rests the decision (see Table I). Of the above factors, I regard muscle tone as the most important, and maintain that if a youth cannot support his own weight he should not be passed as fit. This applies equally to the other and less strenuous branches of the service, although in some particular cases a certain allowance can be made.

All recruits have sooner or later to serve at sea under varying conditions of climate, and during war are likely at any time to be subjected to stresses which will try their physical endurance to the utmost. Therefore, when he is examining young recruits, it behoves the medical officer to bear these conditions in mind and to make his decisions accordingly.

Among the candidates under review who were classed as below naval physical standard, it was obvious that many had never been drilled or had never taken any form of exercise, the muscle tone in all cases was poor, and quite a number were well under the standard weight and chest development for their age (see Figure II). Among these, as was to be expected, were some with various abnormal curvatures of the spine (kyphosis, scoliosis, lordosis). The recruits with fixed or structural scoliosis are considered separately and are not included under the category "below naval physical standard"; they are shown under the detailed review of deformities (see Figure I), and all were aged under twenty-one years.

I am of the opinion that an important factor in these cases is that of diet. In many it is unsatisfactory in regard to both quantity and quality, and in addition meals are often taken at irregular intervals so that the whole

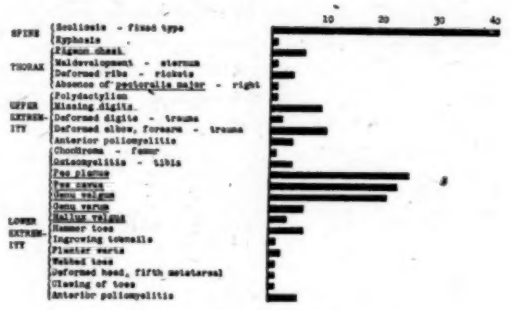

FIGURE I.

In this series of 1,010 unfit recruits, aged from seventeen to thirty-five years, 306 were below naval physical standard, and 180 had deformities—total, 486, or 48% of the unfit and 23% of recruits examined. Of all recruits examined, 8·6% had deformities; 2% had scoliosis. Scoliosis was present in 4·1% of the unfit, and accounted for 22·7% of deformities. Foot deformities represented 35% of all deformities, *pes planus* representing 13·8%. Many of these deformities could have been prevented by due care during adolescence—this applies specially to scoliosis. Some of the recruits with *pes planus* could have been improved by appropriate exercises, and although not fit for the seaman branch, would have been accepted for some other branch of the service if they had so desired. Among the unfit were many who were rejected for more than one cause (some had scoliosis); these are not shown here.

metabolism suffers. This, occurring during the formative period of life, renders the adolescent more liable to deficiency diseases and to various deformities of the skeletal system. Inadequate diet and lack of exercise must be held responsible for recruits classed as "substandard" and for some of those with scoliosis, although in the latter condition anterior poliomyelitis also plays a part. A balanced diet taken at regular intervals, adequate exercise and the avoidance of undue fatigue during adolescence are indicated if such cases are to be prevented in the future. To achieve this, greater supervision of children in the home and at school will be necessary, and parents should endeavour within their means to provide properly balanced meals at regular intervals.

TABLE I.

Age Period. (Years.)	Number Examined.	Number Unfit.	Percentage of Unfit.		Percentage of Recruits Examined.	
			Sub-standard or Below Naval Physical Standard.	Deformities.	Sub-standard or Below Naval Physical Standard.	Deformities.
17 to 20	500	191	45·0	24·0	17·1	9·0
17 to 26	400	143	25·0	12·5	8·9	4·4
17 to 26	1,000	237	20·0	15·0	4·7	3·5
17 to 35[1]	2,090	1,010	30·2	17·8	14·5	5·7
17 to 40	2,986	1,292	24·7	16·6	12·0	7·1
17 to 40	2,542	1,201	29·0	16·8	13·3	7·9

[1] Series reviewed in this article.

FIGURE II.

Chart of age, height and weight in use at the recruiting centre, Sydney. In using this chart, the medical officer allows for a range of seven pounds more or less in weight

MALES.

Height.	17	18	19	20	21	22	23	24	25	26
5 3	8 8	8 10	8 12	9 0	9 4	9 8	9 12	10 4	10 8	10 12
5 4	8 10	8 12	9 0	9 4	9 8	9 12	10 2	10 6	10 10	11 0
5 5	8 12	9 0	9 2	9 6	9 10	10 2	10 6	10 10	11 0	11 4
5 6	9 0	9 2	9 4	9 12	10 2	10 6	10 10	11 0	11 4	11 8
5 7	9 4	9 6	9 8	10 2	10 6	10 10	11 0	11 4	11 8	11 12
5 8	9 8	9 10	9 12	10 6	10 10	11 0	11 4	11 8	11 12	12 0
5 9	9 12	10 2	10 4	10 10	11 0	11 4	11 8	11 12	12 0	12 4
5 10	10 2	10 6	10 8	11 0	11 4	11 8	11 12	12 2	12 4	12 8
5 11	10 6	10 10	11 0	11 4	11 8	11 12	12 2	12 4	12 8	13 0
6 0	10 10	11 0	11 4	11 8	11 12	12 2	12 4	12 5	13 0	13 4
6 1	11 0	11 4	11 6	11 10	12 0	12 4	12 8	12 12	13 4	13 8
6 2	11 4	11 6	11 10	12 0	12 4	12 8	12 12	13 4	13 8	13 10

Average Australian Male, 21 Years old.
Height = 5 feet 7·5 inches.
Weight = 10 stone 8 pounds = 148 pounds.
Chest = 34 inches.

FEMALES.

Height.	18	19	20	21	22	23	24	25	26	27
4 9	7 4	7 5	7 6	7 10	7 11	7 12	7 13	8 1	8 2	8 3
4 10	7 5	7 6	7 7	7 11	7 12	7 13	8 0	8 2	8 3	8 4
4 11	7 6	7 7	7 8	7-12	7 13	8 0	8 1	8 3	8 4	8 5
5 0	7 7	7 8	7 9	7 13	8 0	8 1	8 2	8 4	8 5	8 6
5 1	7 8	7 9	7 10	8 0	8 1	8 2	8 3	8 5	8 6	8 7
5 2	7 9	7 10	7 11	8 1	8 2	8 3	8 4	8 6	8 7	8 8
5 3	7 10	7 11	7 12	8 2	8 3	8 4	8 5	8 7	8 8	8 9
5 4	7 11	7 12	7 13	8 3	8 4	8 5	8 6	8 8	8 9	8 10
5 5	7 12	7 13	8 0	8 4	8 5	8 6	8 7	8 8	8 10	8 11
5 6	7 13	8 0	8 1	8 5	8 6	8 7	8 8	8 10	8 11	8 12
5 7	8 0	8 1	8 2	8 6	8 7	8 8	8 9	8 11	8 12	8 13
5 8	8 1	8 2	8 3	8 7	8 8	8 9	8 10	8 12	8 13	9 0

Average Australian Female, 22 Years Old.
Height = 5 feet 3·5 inches.
Weight = 8 stone 3·5 pounds = 115·5 pounds.
Chest = 33 inches.

In this connexion it may be of interest to quote American opinion in regard to scoliosis. In the United States of America medical authorities apparently place a lateral deviation of the spine in a different category from that of true scoliosis (curvature with rotation of vertebræ), and they accept for general service recruits with a lateral deviation of one inch or less from the mid-line, if mobility and weight-bearing are good. They class as non-acceptable recruits with a lateral deviation from the mid-line of more than two inches, and also those with a curvature (kyphosis, scoliosis, lordosis) of a degree sufficient to interfere with the wearing of uniform and equipment.[1] It would appear from the foregoing that the United States of America authorities do not differentiate between the two main types of scoliosis, structural and functional; recruits with the latter type, unless it is severe, are accepted by us.

Deformities of the Feet.

The deformities of the foot found are shown graphically in Figure I.

The human foot has become greatly modified for the performance of two divergent functions, and evolutionary changes over the years have produced the present-day foot. In standing, the foot must provide a stable support for the body weight—its static or passive function. In walking, it must, in addition to supporting the body weight, provide a resilient spring or lever by which the body can be propelled forward—its dynamic or active function. These objects are catered for by the architectural arrangement of a number of small, spongy bones grouped together in the form of arches. In addition to conferring resiliency on the foot, the arches serve for the dispersal of forces applied to its plantar surface, and they provide necessary space for the passage of nerves and vessels forward towards the sole.[2] The efficiency of these arches depends on the shape of the bones and the ligaments of the foot and on the muscles of the foot and the leg, especialy the latter. The tone of these muscles is most important, since if they are weak, extra strain is thrown upon the ligaments and finally upon the bones themselves.

It will be seen, therefore, that anything that impairs the nutrition of the muscles will be ultimately manifested in one or other of the varying disabilities of the feet. The average normal foot should be supple and mobile and possess spring, and its range of movement as follows: plantar flexion, 45°; dorsiflexion, 10° to 15°; inversion, 60°; eversion, 15°. The instep should be moderately concave and the tibial muscles capable of supporting the arch and allowing it to flatten. The outer border of the foot must be flat and its intrinsic muscles competent to maintain the correct function of the toes. On the plantar surface there should be a reasonable layer of subcutaneous fat to provide padding for the heel and the metatarsal heads. The body weight should be evenly distributed between the heel and the ball of the foot, and the length-breadth ratio should be 2·7:1·0.

Foot Types.

There are three types of foot: (i) average—mobile, of sufficient musculature and correct shape; (ii) narrow—associated as a rule with a poor physique, deficient in spring, predisposed to planus deformity; (iii) broad—a useful foot as a rule, with mobility limited by its shape and thickness. Of the above types, the narrow foot is more likely to break down during training.

It was found at this centre that 68% of the feet examined were of the average type, 19% were narrow and 13% were broad.

Examination of the Feet.

The general appearance is noted, especially the colour of the skin as indicating the condition of the circulation; a bluish-red tint, acrocyanosis, denotes some vascular disturbance, and in these cases a history of chilblains is often obtained. Next, the condition of the skin is investigated. Excessive sweating (hyperidrosis) is found in many nervous disorders. A dry skin (anidrosis), which is inclined to form scales, indicates some endocrine deficiency, for example, hypothyreoidism.

Obvious defects, such as *hallux valgus*, hammer-toe, clawing of toes, and missing digits can be seen at a glance, and if the toes are separated, soft corns and tinea are easily detected.

The recruit is then given the following instructions: (i) "Stand, face me, feet together." (ii) "Rise on toes." (iii) "Heels down." (iv) "Move toes." (v) "Bend your right knee, show the sole of your foot." (vi) "Repeat the manœuvre for the left foot." (vii) "'Double' in the standing position." (viii) "Stop." (ix) "Face me, spread your legs wide apart." If the foregoing routine is carried out, any deformity will be detected and the degree of *pes planus* (if present) evaluated.

I have described the routine employed at this centre, because in my opinion it is most important that the feet of the male recruit should be as nearly as possible perfect. To some extent this is in accordance with the standard laid down in the United States of America: "Individuals with defects of the feet which would prevent them from taking proper training will not be classified for general military service."

Of the other deformities listed, *pes cavus* and *genu valgum* merit some attention, the former because it can in some instances be more disabling than *pes planus*, the latter for its association with *pes planus*.

Summary.

1. One hundred and eighty deformities in recruits were recorded and analysed; scoliosis predominated and was followed closely by *pes planus*.

2. Three hundred and sixty sub-standard recruits (below naval physical standard) are discussed. Many of these deficiencies, as well as some of the cases of scoliosis, could have been prevented had more attention been paid to diet and exercise during adolescence.

3. The importance of a thorough examination of the feet is stressed.

4. A chart (age, height, weight—Table I) is included, and also a comparative table (Table II), showing the percentage of sub-standard types and deformities, including those reviewed in this article.

Acknowledgements.

My thanks are due to Surgeon-Captain W. J. Carr, C.B.E., F.R.A.C.P., Director of Naval Medical Services, for permission to publish this article, and to Writer D. Bull, Women's Royal Australian Naval Service, for typing the manuscript and making fair copies of Figure I and Tables I and II.

References.

(1) Report of the Commission of Physicians appointed to examine the requirements for admission to the Army, Navy and Marine Corps, United States of America, 1944.
(2) W. Mercer: "Orthopædic Surgery", Eleventh Edition.

YOUNG DR. STORCH OF ADELONG.

By Richard T. Kennedy,
Sydney.

In the year 1857 William Balman discovered a quartz reef shot with gold on Adelong Creek, New South Wales. Prior to that Adelong was merely the site of a few prospectors' huts surrounded by unexplored and thickly timbered hills. Avid prospectors there had been since 1853—men who talked in pennyweights of gold. True, there was a roughly-erected shanty where mine host Colin McDonald dispensed potent grog, weevily flour and other essentials; but as for a town, not a sign was there, and by 1856 the alluvial gold was fast petering out, and the Adelong Creek was on the verge of being once again the lonely haunt of the kangaroo, the emu and the black.

William Balman's discovery that there were thick veins of gold in the white quartz rocks that backboned the tree-clad hills brought fame and fortune to many "reefers" for many years; it changed the talk from pennyweights to ounces; it brought a thriving township of two thousand souls that rapidly overawed the primitive shack of host McDonald; and it brought the discoverer, Balman, a short day of lucrative glory before a dynamite explosion crippled him for life! In addition, the newly-found and golden reef brought its moiety of medical men. They came by pack-horse and by wagon. They brought not pick nor shovel wherewith to crack the yellow lucre from its craggy bed. They brought only their little carpet bags replete with scalpel, bleeding sets, saws and the inevitable copies of Ferguson's "Surgery". Among the earliest to settle down at Adelong goldfield were Dr. Charles A. Dibdin, Dr. Fred Homan, Edward Gregory, M.R.C.S., and B. Storch, M.D.

Dr. Dibdin, son of the famous playwright and actor, Thomas Dibdin (1771-1841), and grandson of the more famous nautical lyrist, Charles Dibdin "The Elder" (1745-1814), was probably first in the field, moving there from his previous practice at Goulburn. Dr. Fred Homan followed later. Dr. Dibdin and Dr. Homan have figured in a previous article.(1)

It is proposed here to mention briefly the discoverable highlights in the goldfield career of Dr. B. Storch. Unhappily more is discovered of him in his obituary notice than is to be found in the journalistic archives of the time. He was apparently a bitter rival of the hail-fellow-well-met Charles Dibdin. Storch was of Prussian nationality, a stubborn, determined man and the antithesis of the mercurial Dibdin. Storch was twenty-six years of age when he came to Australia.

It is not hard to believe that the stolid Storch, unused to the rough and tumble of a mining camp, should become the butt of bar-room practical jokes. Upon one occasion the Prussian doctor was summoned urgently to the scene of a bolting horse, with what appeared to be a helpless lady upon its back. The horse was allowed to bolt just as the doctor arrived breathlessly on his own nag. All he could see was a woman in a coloured dress careering over the hill to an obvious and fatal fall. Poor Storch, with pathetic fervour, went hell-for-leather after the damsel in distress, only to find on topping the hill that the bolting horse had thrown off its burden, a roll of striped and coloured diggers' blankets! The practical joke had been arranged by the popular Dr. Dibdin to disconcert his rival.

Will Carter, in an old copy of *The Sydney Morning Herald*, tells us that the rivalry came to a head in the following manner:

> After a supposed insult in a dance room, Storch, egged on by Frank Templeton, Charlie Lewington and other of the fresh lads of the time, demanded satisfaction with horse pistols at close range. When the word was given both men fired and the charge of raspberry jam, secretly arranged, spattered their faces, Storch exclaiming with arms in the air: "Blut! Blut! I am shot, mein Gott, I am shot!"

It was Storch's good fortune to win an unusual court case in the matter of recovery of fees. The newspaper of the time records the details.

Adelong Court of Requests.

Sept. 6th, 1861.

Only one case was defended viz. Storch *v.* Fletcher in which Dr. Storch sought to recover an amount for professional services rendered to a child of Mr. Fletcher's mate, Thomas Hardy. The grounds of the plaintiff were that Mr. Fletcher was the person who called him to attend the child, the child being first attended in Fletcher's house and the accident having occurred through one of Fletcher's children and he [Fletcher] stating that he would see the charges paid.

Defendant admitted the accident was occasioned by his son, that the patient was first attended in his house, denied ever becoming responsible for the professional fees inasmuch as he had told Dr. Storch to look to Hardy for them.

His Worship animadverted on the case and ultimately decided that Fletcher should pay £3 3s. with costs, the balance to be recoverable from Hardy.

"Going to court" was one of the minor occupations of those quarrelsome days, and the doctor was not always so lucky in his cases as was Dr. Storch. There was, for instance, the famous case brought to court by Dr. Storch's rival, Edward Gregory, M.R.C.S., for the detention of his property. It bears repetition from the columns of *The Wynyard Times* of Tumut of February 18, 1862.

On Tuesday last Messrs. J. B. Sharp and G. J. Meynink, Esqs., occupied the Bench and found their time consumed in hearing a charge preferred by Edward Gregory, Surgeon, against Mrs. Maria Watson, late postmistress, of illegally detaining his property, to wit, one tumbler, one pair of blankets, one feather pillow and one chamber utensil of more than ordinary convenience of a total value of 40s. 9d. Mrs. Watson had been Dr. Gregory's erstwhile landlady. Mr. Gregory conducted his own case, Mr. Robertson appearing for the defendant. The doctor, of course, endeavoured to represent to the Bench that the defendant had been to him a veritable "jerry-diddler", but on hearing Mr. Robertson's explanation that the blankets and pillow had been offered but refused, that the tumbler was already returned to and received by the plaintiff and that the last article had that morning been returned by being publicly deposited under the doctor's window, their worships very wisely dismissed the case.

But let us return to Dr. Storch, who no doubt enjoyed the discomfiture of his rival as much as everyone else on those crude and boisterous fields. Storch was a failure in his Australian adventure. This is only too realistically and dramatically revealed by the most extraordinary circumstances surrounding his death. The means he took to end his life are Nipponese in their stark self-cruelty. Here is *The Sydney Morning Herald's* abridged version.

The City Coroner held an inquiry yesterday (May 1, 1867), at the European Hotel, Castlereagh Street, respecting the death of Dr. B. Storch, who committed suicide by stabbing himself in the heart with a knife. Constable Larkin stated that whilst on duty in Castlereagh Street on Thursday night about twenty minutes to nine, he received information that a man had stabbed himself at the European Hotel. He went to the hotel and in one of the bedrooms he saw the body of the deceased lying on its back. There was a wound in deceased's left breast and a quantity of blood on his shirt and clothes. He found a dagger lying on a washstand close to the bed on which the body was lying, the dagger being partly covered with blood. On the body he found a letter, a bill, a small penknife, a razor, a purse and a small package labelled "Poison". In the room he found a valise which contained surgical instruments; a carpet bag and a small box were also pointed out to him as belonging to deceased. He saw no signs of a struggle having taken place in the room. During the last fortnight he had occasionally observed deceased walking about Sydney.

Frederick Summerhof, landlord of the above hotel, stated that deceased was known to him by the name of Dr. Storch. Deceased went to his house a fortnight ago and told him (witness) that he had been turned out of the house where he had last been staying as he had no means. Deceased also stated that the proprietor of the house had kept a gold watch of his worth eight guineas for two weeks' board. Deceased begged of him to let him stop at the hotel for eight days or a fortnight until he could get something to do. Deceased said he expected some money from some party up the country and he consented to allow him to remain. During the time that deceased had been at his house he had been very temperate in his habits. He never drank more than two nobblers a day. Deceased told him he had never in his life been in such reduced circumstances as he was then in and during the last three or four days deceased became despondent and low spirited and was irregular in his habits. On Thursday morning deceased said he was going to leave as he had taken lodgings in Elizabeth Street to commence practice under the patronage of Mr. Tiddeman, chemist. The last time he saw deceased alive was about twelve o'clock on Thursday. He then appeared to be cheerful. On deceased's carpet bag is a brass plate on which is engraved "B. Storch, M.D., Physician and Accoucheur". Deceased was a native of Prussia and had been twelve years in the colony, during nine years of which he had resided at Adelong. From information he received he went into deceased's bedroom and found him as described by Constable Larkin. He never heard deceased threaten to destroy himself; he had never received any money from him; deceased told him his instruments were valuable.

Alexander M. C. Scott stated that he had boarded at the European Hotel since Saturday last and occupied the same bedroom as deceased. Deceased never said he would commit suicide nor was there anything in his manner to lead him to think he was insane. He never saw deceased under the influence of drink.

Henry Tiddeman, chemist, of Pitt Street, stated that he had been acquainted with deceased for about two months and had seen him almost daily during that time. He was low spirited and complained of having no funds. He heard deceased say about three weeks ago that if he did not get something to do he would destroy himself. He last saw deceased alive three days ago and gave him a shilling.

Dr. Oscar Wilke stated that he saw the body of deceased about half an hour after eight o'clock on Thursday evening. He found a wound about three-quarters of an inch wide on the left side. The body was lifeless and must have been so half an hour. Deceased's arms were lying close to his body and the fingers of the left hand were closed and spotted with blood. On the table near the bed he found a two-edged knife (a small amputation knife), the blade of which was partly covered with coagulated blood. Death must have ensued from internal hæmorrhage, very little blood being on the garments. He was of the opinion that the aorta had been divided by the cut and death must have ensued very quick. The wound was such a one as could have been self-inflicted. He examined the body and also the room carefully but saw nothing to induce him to believe the deceased had not committed suicide.

Verdict: "Deceased, aged thirty-six years, committed suicide by stabbing himself with a knife in the heart whilst labouring under a fit of insanity."

It was indeed a case that Sherlock Holmes would have delighted to ruminate upon. Was it likely, for example, that Storch stabbed himself and then put the amputation knife back upon the washstand after withdrawing the knife from his chest? Why should the doctor have preferred this gruesome method to the less cruel one of taking a dose from the contents of his package of poison?

It is a sad picture. One can envisage the adventurous young doctor leaving his fond parents in the little Prussian village, carrying his brand-new carpet-bag with the polished little plate of brass announcing to all the world that: "Here goes young B. Storch, M.D., physician and accoucheur, out to the antipodes to win his fortune in the land where gold is being picked up in handfuls by every Tom, Dick and Harry." And back, in one, two, three or four years will come the famous and now wealthy Dr. Storch, to buy himself a lucrative practice in some great *Strasse* of some great Prussian town, to be the envy of all struggling, stay-at-home little doctors, to be the pride of his parents and villagers, to be pointed out as the great Dr. Storch who went to the Australian diggings and made his fortune!

It was a pathetic ending, and I am sure that even old Dr. Charles Alexander Dibdin, who played so many prac-

tical jokes upon him, let a tear trickle down his cheek when he read of the unhappy fate of his professional opponent. For Dibdin was a kindly man withal.

Reference.

(1) R. T. Kennedy: "Interlude on a Reef", THE MEDICAL JOURNAL OF AUSTRALIA, June 10, 1944, page 531.

SUTURE OF DEEP SOFT TISSUE WAR WOUNDS AIDED BY PENICILLIN THERAPY.

By THOMAS F. ROSE,
Major, Australian Army Medical Corps,
AND
ARTHUR NEWSON,
Major, Australian Army Medical Corps.

IN this paper are presented the results obtained in 108 deep soft-tissue war wounds in the South-West Pacific Area treated by suture and penicillin. A deep soft-tissue wound is one in which the deep fascia and underlying structures are involved.(1) In this series only wounds involving muscle are considered, those causing injury to main vessels, nerve trunks, bones and joints being excluded. Simple perforating rifle bullet wounds with little muscle damage and no increased subfascial tension are also excluded, as they rarely require surgical intervention.

These wounds were caused by rifle or machine-gun bullets, grenades, mortar and high-explosive shells. They were of all types—perforating wounds, penetrating wounds with one or more missiles, and gutter or tangential wounds. As muscle was involved in every case, usually much soft-tissue damage had been sustained, especially when the wound was due to fragments of high explosives or to ricocheting bullets. Most wounds were contaminated by clothing, mud and vegetable matter. In late cases many were infected by hæmolytic streptococci or staphylococci, or by Gram-negative bacilli, such as *Bacillus proteus*, *Bacillus coli* and *Pseudomonas pyocyaneus*, either singly or together. Gas-forming organisms were not encountered in this series.

Treatment.

Field dressings were applied and oral sulphamerazine therapy was commenced as soon as the patient was recovered from the jungle. This was stopped when penicillin could be administered, generally at a forward surgical unit, where it was injected intramuscularly in amounts of 15,000 units every three hours.(2)(3) Gas-gangrene antiserum and tetanus toxoid were also given. Resuscitation with serum, stored blood or fresh blood was carried out when indicated. When radiological facilities were available, all injured parts were radiologically examined and foreign bodies were localized.

Under general anæsthesia (usually with "Pentothal"), the wounds, no matter how old or infected, were then excised in the usual manner, clothing, dirt and damaged tissue being removed. Metallic foreign bodies were removed if easily accessible, either through the original wound or through a new incision, according to their location. It was, of course, realized that infection cannot always be eradicated from a wound by the excision of devitalized tissues and cleansing of the cavity, because, as Kemp(3) points out, radiological studies show that even at the time of injury foreign matter, including air, is drawn into the tissues far distant from the wound track. This air must carry organisms beyond the reach of even radical surgical toilet. Wounds associated with only small openings in skin and deep fascia, but with much muscle damage and hæmatoma formation, were widely opened, the deep fascia being split to prevent the later tension which may arise in a badly damaged muscle ensheathed by deep fascia which has only a small hole in it. When excision was completed and hæmostasis secured by fine catgut ligatures if necessary, penicillin-sulphanilamide powder (5,000 units of penicillin per gramme of powder) was insufflated by a blower until all raw surfaces were covered with a fine frost of powder.

Consideration was now given to whether the wound could be closed by primary suture. If it was clean and not already infected, and if the skin edges could be apposed without tension, this was performed, deep interrupted silkworm gut or nylon sutures being used. (At times, by reason of skin loss, partial suture only could be carried out.) Primary suture was not performed when there was much deep tissue destruction, oozing, œdema or actual infection. Nor was it considered if the patient had to be immediately evacuated, even though the wound appeared safe for suture. Wounds may not be able to be supervised during rapid evacuation of the patient, and infection or tension requiring the urgent release of sutures may be unnoticed, with disastrous effects.(4)(5) Again, over long lines of communication, penicillin therapy cannot always be provided.

Consequently, when suture was not performed, the operation was concluded by covering the wound with "Vaseline" gauze and applying dressings. The gauze was never packed into the wound, as it rapidly becomes an impenetrable plug.

Whether the wound was sutured or not, the intramuscular administration of penicillin (15,000 units every three hours) was continued until it was certain that no infection by penicillin-sensitive organisms was present.

On the fourth or fifth day after excision without suture, the injured parts were radiologically examined, if this had not already been done. Any foreign body that required removal by reason of size or position was localized. The wounds were then inspected in the operating theatre with all sterile precautions. When necessary, wound revision was carried out under anæsthesia, any dead tissue missed at the original operation being excised, hæmatomata evacuated and foreign bodies removed if indicated.

If the wounds were then clinically clean and the skin edges came together without tension, they were sutured after the insufflation of penicillin-sulphanilamide powder. Bacteriological examinations were carried out in this series only in the case of obviously infected wounds, as the clinical appearance of the lesion is the best criterion for suturing.(2)(3) Intramuscular penicillin therapy was then again continued until the risk of infection was over.

If the wounds were clean but still too œdematous for suture, then, after the insufflation of penicillin-sulphanilamide powder and dressing of the wounds with "Vaseline" gauze, they were again reviewed on the eighth to the tenth day, and if circumstances were favourable, they were sutured. (Suture of wounds up to the tenth day after wounding is known as "delayed primary suture".) Penicillin was again administered intramuscularly so long as the chance of infection was present. If it had been stopped before wound suture, it was recommenced twenty-four hours before suturing and continued afterwards as before.

In spite of early excision, some wounds became infected. Others were first examined late after reception (some up to seven days), and were already infected. These infections were usually mixed, and hæmolytic streptococci and staphylococci sensitive to penicillin, and Gram-negative bacilli insensitive to penicillin, were present. In addition to the parenteral administration of penicillin to combat spread of infection by the cocci, local treatment with a 1/1,000 solution of aminoacridine hydrochloride ("Monacrin") was instituted.(6) "Monacrin" is bactericidal, not only to hæmolytic streptococci and staphylococci, but also to *Bacillus coli* and *Bacillus proteus*, though to a lesser degree. It has no effect on *Pseudomonas pyocyaneus*, but wounds infected with this organism may be treated with a 1/1,000 solution of "Monacrin", to which 2% of acetic acid has been added. Shallow wounds were syringed with 1/1,000 "Monacrin" solution twice a day, and then gauze soaked in the solution was placed in them. Albert(6) has shown that "Monacrin", though absorbed by surgical gauze, is not fixed by it, so that it comes into solution in the body fluids. Deep wounds were treated by the insertion of a tube, with lateral holes, connected to a "Soluvac" bottle filled with the solution. This was allowed to drip continuously into the wound at the rate of eight drops per minute, in the manner recommended by Turnbull.(7) At the end of two days, the

wounds were again inspected after being syringed with saline solution. Fresh sterile tubes were reinserted, and the treatment was continued until the wounds appeared clinically clean enough for suture. This treatment was efficacious for all infected wounds, particularly for foul wounds infected with Gram-negative bacilli.

These infected wounds were not generally ready for suture until well after the tenth day (secondary suture), and the operation often entailed more than suturing. The growth of epithelium tended to invert the skin edges, and it had to be excised. In many instances, too, the skin had retracted and undercutting was necessary before the edges could be apposed—a manœuvre which may also be used with safety in primary or delayed primary suturing. If much scarring or indolent granulation tissue was present, a complete wound excision was performed before the suturing. In a few instances it was necessary to use split skin grafts in addition to partial suture. In all cases, penicillin-sulphanilamide powder was insufflated into the wound before it was sutured. Here, again, penicillin was used parenterally both before and after suturing, in the manner already described.

In this series penicillin solution was not administered locally through tubes, because previously we had seen many wounds infected with Gram-negative organisms from this source. It has also been shown that penicillin is of no value when used as an irrigating solution, since it must remain for at least six to eight hours in contact with organisms to exert its maximum effect.[9] In a few early wounds, too, we used local drainage tubes; but we have ceased to do this, as they also appear to encourage infection.[13] Even if infection does not supervene, the tube track may take a long time to heal. Instead of using tube drainage, it is best to delay suture.

Attention was also paid to the patient's general well-being. Adequate protein and vitamin intake was ensured by balanced diet. Blood transfusions were given when necessary, and general diseases such as hookworm infestation, malaria and dermatitis were treated.

If suturing was unsuccessful, the cause of failure was investigated and dealt with, and the wound was again prepared for suture, grafting or plastic repair (*vide* Table V).

Results.

The results of suturing have been divided into two categories, successful and unsuccessful. By a successful result, we mean a wound which, once sutured, has healed without further surgical intervention. Some wounds healed by first intention, some had a serous discharge and others gaped a little at different parts, but rapidly healed with a small amount of granulation tissue. An unsuccessful result refers to those wounds which for any reason required further surgical intervention, either early or late.

The results were summarized in Table I. Thus, of 108 wound suture operations, 91 were successful; of 47 operations for primary suture, 37 were successful; of 35 delayed primary suture operations, 30 were successful; and of 26 operations for secondary suture (including four for late complete excision and suture), 24 were successful.

The successful suture operations are summarized in Table II. The average times of excision after reception of the wound, of suture after reception of the wound, and of healing, were more or less identical in all regions except the scalp (with temporal muscle involvement); results in this region are listed separately, as its healing times and penicillin requirements were less than in the more muscular regions.

TABLE I.

Summary of Results.

Site of Wound.	Successful Suture Operations.				Unsuccessful Suture Operations.				Total Wounds.
	Primary.	Delayed Primary.	Secondary.	Total.	Primary.	Delayed Primary.	Secondary.	Total.	
Thigh	12	12	10	34	1	3	1	5	39
Shoulder	5	4	2	11	3	1	0	4	15
Buttock	4	5	3	12	0	0	1	1	13
Calf	3	3	4	10	3	0	0	3	13
Scalp	5	1	1	7	1	0	0	1	8
Forearm and hand	4	2	2	8	0	0	0	0	8
Arm	2	2	1	5	0	1	0	1	6
Back	2	1	1	4	2	0	0	2	6
	37	30	24	91	10	5	2	17	108

TABLE II.

Successful Suture Operations.

Site of Wound.	Type of Suture.	Number of Wounds.	Average Time of Excision after Reception.	Average Time of Suture after Reception.	Average Healing Time after Suture. (Days.)	Average Healing Time after Reception. (Days.)	Average Amount of Penicillin. (Hundreds of Thousands of Units.)
Thigh, shoulder, buttock, calf, forearm and hand, arm, back	Primary	32	10 hours (6 to 24)[1]	10 hours	13 (8 to 20)	13	4·5 (2·4 to 4·8)
	Delayed primary	29	10 hours (7 to 14)	5·5 days (3 to 10)	12 (8 to 21)	17·5 (11 to 29)	7·7 (3·6 to 15·6)
	Secondary	23	31 hours (12 hours to 7 days)	14 days (11 to 27)	13 (10 to 21)	27 (19 to 41)	11·3 (6·6 to 19·2)
Scalp; *musculus temporalis*	Primary	5	11 hours	11 hours	7·5	7·5	3·2
	Delayed primary	1	4·8 hours	4 days	10	14	4·8
	Secondary	1	8 days	11 days	8	19	7·2

[1] The figures in parentheses show the extremes in variation.

These results show the benefit of the early suture of war wounds. Jeffrey and Thomson[6] stated that in their cases 70% of buttock wounds healed in ten days, whereas previously the average time was forty days. Naturally, a patient may not be fit to leave hospital as soon as his wound is healed. Patients with large muscle wounds require prolonged physical therapy for complete recovery. The wound, too, may be the least serious of multiple injuries.

Table II shows that the wounds requiring the most prolonged treatment and the greatest amount of penicillin were those which were treated by secondary suture. For the 23 wounds (scalp wounds excluded) sutured in this manner, the average time of excision after reception of the wound was thirty-one hours (the period varied from twelve hours to seven days). Suture could not be performed for an average period of fourteen days after reception of the wound. Once the wound was sutured, the healing time was equal to that of wounds treated by primary and delayed primary suture; but the total healing time after reception of the wound was much longer, being twenty-seven days as compared with seventeen and a half days and thirteen days respectively for delayed primary suture and primary suture. Penicillin requirements were also greater than those of wounds sutured earlier.

The chief factor causing these wounds to be sutured late, apart from their large size, or from prolonged œdema due to extensive muscle damage, was the presence of infection. Of the total 26 cases of secondary suture in this series, in ten infection was already present—in six with mixed penicillin-sensitive hæmolytic streptococci or staphylococci and Gram-negative bacilli (*Bacillus proteus* and *Bacillus coli*), in two with *Bacillus proteus* only, in one with a penicillin-sensitive staphylococcus and in one with a penicillin-sensitive *Streptococcus hæmolyticus*. In seven other cases infection developed during treatment, in four with *Bacillus proteus*, in two with a mixture of organisms and in one with streptococci.

The time interval between reception of the wound and the first surgical excision is important. Of 79 clinically clean wounds treated within twelve hours of reception, 12 only became infected—seven with penicillin-sensitive streptococci or staphylococci, either alone or with Gram-negative bacilli, and five with Gram-negative bacilli only. Of 16 clean wounds excised after twelve hours, four became infected—two with penicillin-sensitive organisms and two with Gram-negative bacilli. Thus, of 95 clinically clean wounds, 16 became infected.

The effect of infection on the course of these wounds may be seen in Table IIIA, where the general results of the successfully sutured wounds are seen to be practically synonymous with those of secondary suture in Table II. But, of the 16 wounds infected during treatment, nine were unsuccessfully sutured, and they accounted for nine of the seventeeen unsuccessful operations for suture in this series (Cases III, V, VI, VIII, X, XI, XIII, XV and XVI, Table V).

Thirteen wounds were already infected before the patients reached surgical care, the delay being chiefly due to evacuation difficulties. Nine of these infections were due to penicillin-sensitive hæmolytic streptococci or staphylococci, with or without Gram-negative bacilli. The remaining four were due to Gram-negative bacilli only. The lateness of surgical treatment in these cases may be seen in Table IIIB. These wounds had the longest healing times of any of the successfully sutured wounds, and required the most penicillin. In fact, their healing time after reception was longer than that of many of the unsuccessfully sutured wounds. They were all successfully treated by secondary suture, because the infections were overcome before suture was performed. Four of these wounds had to be treated by complete late excision with suture.

Thus, in a total of 108 wounds, 29 were infected at some time or other after reception. The distribution of the infecting organisms is summarized in Table IV. Staphylococci, in pure or mixed culture, were present in 13 cases,

Table III.

Successful Suture.[1]

Observation	A. Infection Supervening during Treatment.		B. Infection Present Prior to Excision.	
	Due to Penicillin-sensitive Cocci, with or without Gram-negative Bacilli.	Due to Gram-negative Bacilli (*Bacillus proteus* and *Bacillus coli*.)	Due to Penicillin-sensitive Cocci, with or without Gram-negative Bacilli.	Due to Gram-negative Bacilli.
Number of wounds	4	2	9	4
Average period after reception before excision	21 hours (4 to 48)[2]	21 hours	80 hours (17 hours to 7 days)	27·5 hours (14 to 48)
Average period before suture (days)	13 (6 to 16)	12·5	16 (7 to 27)	12 (8 to 17)
Average time of healing after suture (days)	14 (10 to 16)	14	16 (12 to 21)	21 (19 to 24)
Average time of healing of wound after reception (days)	27 (24 to 30)	26·5	32 (19 to 41)	26·5 (26 to 28)
Average amount of penicillin used (hundreds of thousands of units)	11 (7·2 to 15)	8·8	13·0 (7·2 to 19·2)	11·5 (7·2 to 15·5)

[1] Among the unsuccessful sutures recorded in Table V, ten of the wounds were infected during treatment, five by penicillin-sensitive cocci and five by Gram-negative bacilli, one being a pure *Pseudomonas pyocyaneus* infection.

[2] The figures in parentheses show the extremes of variation.

Table IV.

Bacteriological Condition of the Infected Wounds.

Organism.	Pure Culture.	With *Bacillus proteus*.	With *Bacillus coli*.	Total Wounds.
Penicillin-sensitive hæmolytic *Staphylococcus aureus*	7	6	0	13
Penicillin-sensitive *Streptococcus hæmolyticus*	2	4	0	6
Bacillus proteus	7	0	2	9
Pseudomonas pyocyaneus	1	0	0	1
Total	—	—	—	29

No example of clostridial infection.

TABLE V.

Unsuccessful Suture.

Case No.	Region and Type of Wound; Missile.	Period before Excision; Amount of Penicillin Used.	Period before Suture; Amount of Penicillin Used.	Time of Failure after Suture; Cause of Failure.	Treatment after Failure; Amount of Penicillin Used; Final Result.	Time of Healing after Reception of Wound. (Days.)	Total Amount of Penicillin Used. (Hundreds of Thousands of Units.)
			Primary Suture.				
I	Shoulder; gutter. L.M.G.[1]	8 hours.	8 hours; 720,000 units.	8 days; sterile muscle necrosis.	Immediate excision of muscle, and suture; 360,000 units; healed in 10 days.	18	10·8
II	Shoulder; gutter. L.M.G.	8 hours.	8 hours; 720,000 units; healed in 14 days.	6 weeks; sterile muscle necrosis.	Immediate excision of muscle and suture; 480,000 units; healed in 12 days.	—	12·0
III	Calf; penetrating; mortar.	8 hours; foreign body removed.	8 hours; 360,000 units.	3 days; abscess, *Staphylococcus aureus* and *Bacillus proteus*.	Healed by granulation in 12 days; 720,000 units.	15	10·8
IV	Calf; perforating; mortar.	8 hours.	8 hours; 720,000 units.	6 days; œdema causing tension; penicillin continued, 480,000 units.	Resutured 4 days later; 240,000 units; healed in 10 days.	20	14·4
V	Scalp; penetrating; mortar.	8 hours; foreign body not removed.	8 hours; 240,000 units; healed in 8 days.	3 months; abscess, *Staphylococcus aureus*, round foreign body.	Removal of foreign body, evacuation of abscess and immediate suture; penicillin 360,000 units; healed in 6 days.	—	6·0
VI	Calf; penetrating; mortar.	10 hours; foreign body not removed.	10 hours; 360,000 units.	10 days; abscess, *Staphylococcus aureus*, round foreign body.	Removal of foreign body and evacuation of abscess; penicillin, 360,000 units; healed by granulation in 12 days.	22	7·2
VII	Thigh; gutter; rifle.	10 hours.	10 hours; 320,000 units; healed in 11 days.	17 days; gaped 6 days after removal of sutures; no infection.	Immediate resuture; penicillin, 880,000 units; healed in 10 days.	27	12·0
VIII	Back; penetrating; H.E.	12 hours; foreign body removed.	12 hours; 720,000 units.	8 days; *Bacillus proteus* abscess.	Abscess incised; healed by granulation tissue in 14 days.	22	7·2
IX	Back; gutter; H.E.	12 hours.	12 hours; 480,000 units.	4 days; hæmatoma.	Sutured four days later; penicillin, 360,000 units; healed in 14 days.	22	8·4
X	Shoulder; gutter; rifle.	12 hours.	12 hours, with drain; 960,000 units.	8 days; abscess, *Streptococcus hæmolyticus* and *Bacillus proteus*, due to drain; penicillin continued, 480,000 units.	Sutured four days later; penicillin, 240,000 units; healed in 16 days.	28	16·8
			Delayed Primary Suture.				
XI	Thigh; gutter; L.M.G.	7 hours; 360,000 units.	3 days; 360,000 units.	8 days; abscess, *Staphylococcus aureus*; penicillin continued, 240,000 units.	Sutured 12 days later; penicillin, 480,000 units; healed in 12 days.	32	13·8
XII	Thigh; gutter; L.M.G.	6 hours; 480,000 units.	4 days; 720,000 units.	6 days; œdema causing tension; penicillin continued, 360,000 units.	Late excision and suture 10 days later; penicillin, 1,320,000 units; healed in 14 days.	34	28·8
XIII	Arm; perforating; L.M.G.	8 hours; 480,000 units.	4 days; 360,000 units.	10 days; *Pseudomonas pyocyaneus* abscess; penicillin continued, 360,000 units.	Late excision, partial suture and split skin graft, 7 days later; 480,000 units; healed in 14 days.	35	16·0
XIV	Shoulder; perforating; rifle.	18 hours; 600,000 units.	5 days; 420,000 units.	8 days; œdema causing tension; penicillin continued, 360,000 units.	Late excision, partial suture and split skin graft 8 days later; 360,000 units; healed in 14 days.	35	17·4
XV	Thigh; penetrating; grenade.	8 hours; Foreign body not removed; 240,000 units.	8 days; 240,000 units; healed in 10 days.	3 months; *Staphylococcus aureus* abscess round foreign body.	Foreign body removed; 24,000 units; wound healed by granulation, 8 days.	—	7·2
			Secondary Suture.				
XVI	Thigh; penetrating; grenade.	8 hours; foreign body removed; 600,000 units.	12 days; 600,000 units.	6 days; *Bacillus proteus* abscess; penicillin continued, 480,000 units.	Resutured 6 days later, 600,000 units; healed in 12 days.	36	22·8
XVII	Buttock; gutter; H.E.	6 hours; 720,000 units; became infected, *Bacillus proteus*.	28 days; excision and suture; 480,000 units.	4 days; hæmatoma.	Immediate evacuation of hæmatoma and suture; 480,000 units; failed 8 days later due to tension; sent on for plastic repair.	—	16·8

[1] "L.M.G." = "light machine gun"; "H.E." = "high explosive".

Bacillus proteus in nine, streptococci in pure or mixed culture in six, and *Pseudomonas pyocyaneous* in one only.

It is difficult to draw any conclusions as to the benefit of the prophylactic use of penicillin in this series, as there were in this area no control series of wounds treated without penicillin. Cutler *et alii*[4] found that the prophylactic use of penicillin with adequate surgical measures did not lower the incidence of infection in aerial wounds. Nevertheless, in this series, the infections all remained localized, never becoming more than a surrounding cellulitis or abscess in the case of the cocci, or a surface infection or abscess in the case of the Gram-negative bacilli. There was no instance of generalized infection.

No wounds became infected with clostridia, though one casualty had a hæmolytic streptococcal myositis, which clinically looked like gas-gangrene. That gas-gangrene may occur during treatment with penicillin has been shown by Cutler and Sandusky.[5]

There were 17 cases of unsuccessful suture—ten of primary suture, five of delayed primary suture and two of secondary suture. The details are summarized in Table V.

The chief cause of failure was infection, which accounted for nine cases; suturing under tension (four cases), hæmatoma formation (two cases), sterile muscle necrosis (two cases) and the too early removal of sutures (one case) were the other causes. These causes are mostly preventible. The risk of infection is, of course, always present in deep wounds, no matter how early or carefully excision is performed.[6] This risk may be diminished by the avoidance of local drainage tubes and by delaying suture in doubtful cases. The parenteral administration of penicillin cannot prevent the onset of infection with Gram-negative bacilli; only complete wound excision can do this, and it does not always prevent infection due to penicillin-sensitive organisms, but it will keep such infection localized. Small foreign bodies may act as the cause of an abscess (three cases), even as long as three months after healing of the wound (Case XV). Naturally, it is an ideal to remove every foreign body to prevent this, but it is difficult to tell which foreign bodies will cause abscesses, as so many remain inert in the tissues. Case XV shows, however, that some of the successful suture operations, when foreign bodies are left *in situ*, may later become failures.

Cases I and II are of special interest, in that inadequate excision of muscle at the time of primary suture caused later wound breakdown, owing to the presence of sterile necrosed muscle. It is often impossible to tell whether muscle is dead or not soon after reception of a wound, and this has been used as an argument against primary suture of deep wounds. Nevertheless, failure from this cause occurred only twice in 47 cases of primary suture, and the parenteral exhibition of penicillin prevented infection of the necrosed area.

Care was taken in all cases not to remove sutures too early, as this is a cause of failure. Table II shows that healing times after suture may vary from eight to as long as twenty-one days, and the too early removal of the sutures will cause gaping of a slowly healing though otherwise normal wound. In Case VII, sutures were removed on the eleventh day, yet six days later the wound quietly gaped. These war wounds differ from clean elective surgical wounds, in that the tissues round them are bruised and contused and may be slow to heal.

In certain areas, especially the buttocks and shoulders, it is well known that suture or plastic repair may fail, even though all circumstances are favourable for healing.[15]

Conclusions.

1. One hundred and eight deep war wounds were treated by suture and penicillin therapy. Ninety-one were successfully sutured, and in 17 suture failed. Of the successful suture operations, 37 were for primary suture, 30 for delayed primary suture and 24 for secondary suture. Of the unsuccessful suture operations, ten were for primary suture, five for delayed primary suture and two for secondary suture.

2. The time of healing after reception of the successful primarily sutured wounds averaged 13 days, that of the delayed primarily sutured wounds averaged seventeen and a half days, and that of the secondarily sutured wounds averaged twenty-seven days.

3. Failure of suturing with necessary further treatment led to a prolongation of the average time of healing after reception of the wound. In primarily sutured wounds this time averaged twenty-two days, in delayed primarily sutured wounds it averaged thirty-four days, and of the secondarily sutured wounds, in one it was thirty-six days and the other still required plastic surgery after forty days.

4. In all the above-mentioned groups the healing time after suture was approximately the same (twelve to fourteen days), and was not related to the time of suture after reception of the wound. It was, however, a little longer (sixteen to twenty-one days) for wounds already infected.

5. The efficacy of penicillin is shown in the following ways: (*a*) Of 79 clinically clean wounds excised within twelve hours of reception, seven only became infected with penicillin-sensitive organisms, and of 16 "clean" wounds excised after twelve hours, two only became infected with penicillin-sensitive organisms. (*b*) Of the patients with these infected wounds, and nine patients whose wounds were already infected with penicillin-sensitive cocci before treatment, none developed a general or a spreading infection. (*c*) There were no cases of gas gangrene in this series.

6. The efficiency of "Monacrin" used locally in the treatment of Gram-negative bacillary infections is shown.

7. Infection is shown to be the main cause of the necessity for delay in suture, and the main cause of the failure of suture.

Acknowledgement.

We wish to thank the Director-General of Medical Services, Australian Military Forces, Major-General S. R. Burston, for permission to publish this paper. We also wish to thank Captain K. Sewell, Australian Army Medical Corps, who made the bacteriological investigations of the infected wounds.

References.

(1) A. Albert: Quoted by H. Turnbull, *loco citato*.

(2) D. G. Anderson: "The Treatment of Infections with Penicillin", *The New England Journal of Medicine*, Volume CCXXXII, April 5, 1945, page 409.

(3) J. P. Cole and H. B. Neel: "Injuries of the Extremities in Amphibious Warfare", *Surgery, Gynecology and Obstetrics*, Volume LXXIX, December 6, 1944, page 573.

(4) E. C. Cutler, P. C. Morton and W. R. Sandusky: "Observations on the Prophylactic Use of Penicillin in Wounds of Aerial Warfare", *The British Journal of Surgery*, Volume XXXII, 1944, page 207.

(5) E. C. Cutler and W. R. Sandusky: "The Treatment of Clostridial Infections with Penicillin", *The British Journal of Surgery*, Volume XXXII, 1944, page 168.

(6) A. Fleming, J. Suchet, M. Y. Young and A. J. Rowe: "Penicillin Content of Blood Serum after Various Doses of Penicillin by Various Routes", *The Lancet*, Volume II, November 11, 1944, page 621.

(7) M. E. Florey and H. W. Florey: "General and Local Administration of Penicillin", *The Lancet*, Volume I, March 27, 1943, page 387.

(8) J. S. Jeffrey and S. Thomson: "Penicillin in Battle Casualties", *British Medical Journal*, Volume II, 1944, page 1.

(9) F. H. Kemp: "X-Rays in Diagnosis and Localisation of Gas Gangrene", *The Lancet*, Volume I, March 17, 1945, page 332.

(10) T. R. Sarjeant and W. A. Morton: "Delayed Suture of Soft Tissue Wounds", *The Lancet*, Volume II, September 9, 1944, page 333.

(11) H. Turnbull: "A Rational Treatment of Gunshot Wounds of Long Bones with Established Sepsis", *The Australian and New Zealand Journal of Surgery*, Volume XIV, July, 1944, page 3.

(12) C. S. Whelan and W. D. Thompson, junior: "Skin Grafting and Secondary Closure in War Wounds", *Surgery, Gynecology and Obstetrics*, Volume LXXIX, December, 1944, page 584.

(13) H. Wilson: "Secondary Suture of War Wounds", *Annals of Surgery*, Volume CXXI, February, 1945, page 129.

(14) H. Wilson and F. Threadgill: "Secondary Suture of War Wounds", *Bulletin of the United States Army Medical Department*, Volume LXXXII, 1944, page 77; abstracted in *International Abstract of Surgery*, April, 1945, page 296.

Reports of Cases.

LEPROSY: A REPORT OF NINE CASES AMONG NATIVES OF THE MOUNT HAGEN AREA IN NEW GUINEA.

By Nathan Shlimovitz,
Captain, Medical Corps, Army of the United States.

The existence of leprosy among the natives of the coastal regions of New Guinea has been known for some time, and a leprosarium was maintained at Madang for their treatment. Very little was known medically about the natives that lived in the interior highlands of the country. The writer had the opportunity of studying these people over a period of two months, from June to August, 1944, at an Australian native administration station in the Mount Hagen area. This area is over five thousand feet above sea level and is believed to be free of malaria. As far as can be determined by investigation of the literature and from discussion with Australian medical officers who had worked in the mandated territories, leprosy had not been reported as existing in the interior of New Guinea. Upon receiving a skin biopsy from a leper patient, Major T. C. Backhouse, pathologist to an Australian general hospital, who had been in Rabaul before the war, stated in a letter to the writer: "I am rather surprised if the case is of local origin, as I had not expected leprosy to have found its way into Mount Hagen, for although it is relatively common in the Madang and Aitape coasts, the chief focus in the mandated territory is in New Hanover and in New Ireland."

Figure I.

The first patients with leprosy were observed in the native hospital, where they came to have treatment for their open sores. Later, others were seen throughout the area, but no attempt was made at census taking or isolation of these patients.

Case I.

A male native, aged thirty-five years (Figure I), came to the hospital for treatment of the sores about the lower portions of his legs and his ankles. They were from five millimetres to 1·5 centimetres in diameter, and were open, ulcerated lesions with some elevation, which gave off a clear serous discharge; microscopic examination of smears of this discharge revealed the lepra bacilli. This patient had no hair on his eyebrows, and only a scant amount of hair was left on his face. He had large nodules on the lobes of both ears, many nodules on his forearm, which seemed to follow the course of the ulnar nerve, and many nodules on his back and legs, particularly on his buttocks. These nodules varied in size from 0·5 to 2·0 centimetres in diameter, some being firm and some fluctuant. A few were secondarily infected and pus could be expressed. Biopsies of these nodules revealed a pathology similar to that of a fibroma, but smears stained with Ziehl-Neelsen's stain were found to contain the *Bacillus lepræ*. This man had hypertrophy of both nipples. He also had spontaneous epistaxis, and an enlarged liver and spleen. He reported that his condition had existed for at least ten years, and had not caused him much discomfort. Late in July, 1944, while at the hospital, he had a rise in temperature to 102° F. and complained of anæsthesia over his entire body, with terrific pain upon movement in his hands and feet. This pain was described as being in the bones and was of such intensity that morphine was required. His temperature at no time returned to normal within the next four weeks, and ranged from 100° F. to as high as 106° F. The nodules of his body seemed to decrease in size, and in general, his skin lesions appeared greatly improved. He wasted considerably, and when the writer left in August, 1944, the patient was rapidly going downhill.

Case II.

A female patient, aged about forty years, had a few small lesions about both ankles and no hair on her eyebrows (Figure II). There was obvious destruction of the nasal cartilage with depression of the nose and a constant foul discharge, microscopic examination of which showed it to be heavily loaded with the *Bacillus lepræ*. Her voice was extremely hoarse, and she was presumed to have an involvement of the larynx. Her liver and spleen were both enlarged, as outlined in Figure II.

Case III.

A young man, aged about twenty-eight years, had large, vitiliginous, anæsthetic-plaques on his back; these were slightly elevated and coarse to the touch. His hands had the typical leper-claw deformity, which was more pronounced in the third, fourth and fifth fingers, and there was an associated atrophy of the hypothenar muscles. The ulnar nerve could be palpated and was thickened. The epitrochlear and axillary lymph glands were enlarged. The liver was about two fingers' breadth below the costal region.

Comment.

There were three other patients who had only the vitiliginous plaques. Two of these complained of paræsthesia instead of anæsthesia. Biopsy of these plaques demonstrated the lepra bacilli.

Case VII.

A young male native, aged about thirty years, also had absence of beard and eyebrows. The ulnar nerve was enlarged, but there was no hand deformity. He had a few sores about his ankles, from which a clear serum containing the lepra bacilli could be expressed. Both his liver and spleen were greatly enlarged.

Case VIII.

A woman, aged about forty-five years, had no hair on her eyebrows, a slightly enlarged liver and the typical leper claw hands (Figure IV). These hands were more deformed than those of the others, and she had an open lesion just

Figure II.

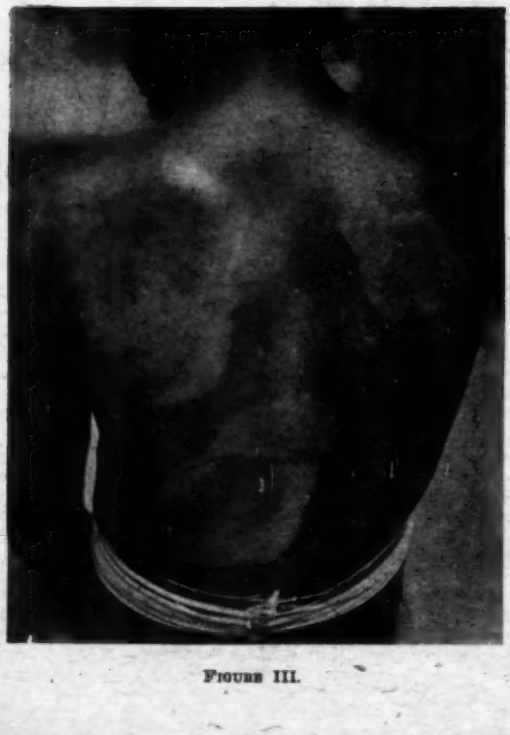

Figure III.

below the palm of the left hand. The thenar and hypothenar muscles were atrophied. The fingers had the claw shape with small ulcers at the first interphalangeal joint. She had enlarged ulnar nerves and enlargement of the epitrochlear and axillary lymph glands. She also had sores about her ankles and clawing of the toes of her right foot, which she stated were anæsthetic and had been unknowingly burnt before the fire.

Case IX.

A male native, aged forty-five years, was considered insane by the natives and was undoubtedly psychotic, owing to his manic demonstrations, which amused the natives considerably. Open lesions on his feet were found on microscopic examination to contain lepra bacilli, and he had the leper-claw deformity of his hand and also enlarged ulnar nerves.

Conclusion.

It was found that Gram stain was as suitable for demonstrating the lepra bacilli as was the Ziehl-Neelsen stain. Case I was the only case of nodular leprosy observed. No

Figure IV.

chaulmoogra oil or related compounds were available for treatment.

Conversations with Major J. Taylor, District Officer of the Bena Bena area, led to the plan for the isolation of an area in which to place these patients. The writer left before these plans were carried out; but as the coastal leprosaria were not functioning, it was deemed advisable to isolate these patients until such a time as they could be placed in a leprosarium.

It is logical to assume that as leprosy exists in the Mount Hagen area, it undoubtedly exists in other localities on this plateau. Any plans to patrol these areas with a view to locating existing cases is, of course, a problem for the Australian medical authorities. It is the writer's purpose only to call attention to the existence of this disease in the new area.

A NOTE ON TWO LABORATORY INFECTIONS WITH THE VIRUS OF NEWCASTLE DISEASE OF FOWLS.

By S. G. ANDERSON, M.B., B.S.,
From the Walter and Eliza Hall Institute of Research in Pathology and Medicine, Melbourne.

IN a recent communication, Burnet[1] reported an accidental laboratory infection induced in human conjunctiva by the virus of Newcastle disease of fowls. This virus had been grown concurrently with influenza B virus in a fertile egg. The inoculum was large, and the infection was fairly severe, but localized in its severity to the one conjunctival sac. Preauricular adenitis developed and general symptoms—headache and malaise—were noted; but all these were transitory.

A rise in the titre of serum antibody was detected by tests *in vitro* and *in vivo* in samples obtained over the four weeks following the infection; but the degree of rise, though significant, was only slight.

The following note records the occurrence of two further laboratory infections due to the same strain of virus, which had been maintained by chick embryo passage and storage at −79° C. between the time of the previous infection and the time of the two reported here.

Case I.

In the course of certain experiments dealing with the adsorption of influenza virus onto calcium phosphate, it was desired to use the virus of Newcastle disease as a control. Therefore, allantoic fluid was harvested from a chick embryo which had died as a result of infection with the latter virus. The virus was completely adsorbed by precipitation of calcium phosphate in its presence; the phosphate was washed, to remove the remaining allantoic fluid, and resuspended in normal saline solution of a volume one-fifth of that of the original allantoic fluid.

A small amount of this suspension was splashed onto the face of a laboratory assistant (McK.). No treatment was given, as it was not realized at the time that infective material might have entered the eyes. Two days later mild bilateral conjunctivitis ensued, one eye being more severely affected than the other. There was some œdema of the lids, but no purulent discharge was present, nor were general symptoms noted. Conjunctival fluid was obtained on the first day of the symptoms. The following day the subject's condition was improving, and three days later no sign of the trouble remained. No adenitis was noted.

The small amount of conjunctival fluid obtained was diluted 1:10 in normal saline solution; penicillin was added to give a concentration of 100 Oxford units per millilitre, and the mixture was inoculated without further treatment into the allantoic cavity of fertile eggs which had been incubated for eleven days.

Allantoic fluid from these eggs, after two days' further incubation, yielded the Hirst phenomenon of red cell agglutination with a "+" end point at 1:40. After further passages in fertile eggs, virus in this fluid was identified as the virus of Newcastle disease by its lethal effect on chick embryos, by the production of characteristic hæmorrhages in these embryos and by its serological reactions.

Serum obtained from the patient before the accident and thirty days subsequent to the infection were inactivated at 56° C. and titrated against five agglutinating doses of Newcastle disease virus, a modified Hirst technique being used. The rise in serum antibody level detected was not significant, even when virus and serum dilutions were incubated together at 37° C. for ninety minutes before the addition of red cells.

Case II.

Some months after the previous infection had occurred, another laboratory assistant was daily harvesting eggs previously inoculated with the virus in the allantoic cavity. On waking one morning she noticed a slight irritation of the left eye, but otherwise complained of no symptoms. On examination of the patient, mild bulbar conjunctivitis was seen, less severe than that of McK.; there was no œdema of the lids, and no purulent discharge was present. The infection was confined to one eye.

Conjunctival fluid was collected. The following day the condition of the eye had improved, and no signs of local infection remained three days later. However, five days after the original signs of inflammation were noted, the left preauricular lymph gland was mildly enlarged and tender to palpation. This adenitis subsided two days later.

The technique of isolation of virus from the tears was the same as in the case of McK. The identity of the virus was similarly established, and the rise in the level of serum antibody was estimated by in-vitro methods. The degree of rise was not significant.

No history was obtainable that suggested the method of infection of the eye in this case. Presumably it was by contamination of the fingers with virus during harvesting of the eggs.

Comment.

While these two cases were of trivial infections only, taken together with the case previously reported by Burnet, they further indicate the potential pathogenicity of the virus of Newcastle disease of fowls for certain human tissues.

Reference.

[1] F. M. Burnet: "Human Infection with the Virus of Newcastle Disease of Fowls", THE MEDICAL JOURNAL OF AUSTRALIA, Volume II, 1943, page 313.

Reviews.

PROGRESS IN NEUROLOGY AND NEUROPSYCHIATRY.

IN the fifth edition of "Recent Advances in Neurology and Neuropsychiatry", Dr. E. B. Strauss has rejoined his collaborator of the first three editions after a literary separation of ten years, the fourth edition having been the work of Dr. W. R. Brain alone.[1] The development of physical methods of investigation and treatment of mental diseases, more particularly electroencephalography, cortical stimulation therapy and frontal leucotomy, has drawn psychiatry towards the neurological fold. The increasing number of problems of mutual interest to neurologist and psychiatrist have thus combined to bring Brain and Strauss together again on the neuropsychiatric stage and we applaud their reappearance.

In the opening chapter on headache, which gives one the impression of being sketchy, there is no new material with the exception of the reference to Kunkle's and his co-workers' observations on lumbar puncture drainage headache. In diagnostic methods in intracranial tumour the latest paper reviewed is dated 1939. There is no reference to torulosis in the chapter on meningitis and other forms of intracranial infection. The Guillain-Barré syndrome also appears to have been overlooked and nervous lesions in typhus will no doubt be mentioned in a subsequent edition. Information on electroencephalography is full and up to date, and its application in the psychoses is discussed as well as in epilepsy and in cerebral lesions. Forty pages are devoted to the subject of head injuries in which the war literature is not inconsiderable; the chapter concludes with some forty references.

The rival views of Fulton and Walshe regarding the functions of the frontal lobe are set out and the latter's paper of 1942 is reviewed at length. The discussion turns on the extent of the area which should be considered as motor, and on what cells are to be included in the pyramidal system. Also what areas are to be held responsible for (*a*) paralysis and (*b*) spasticity? Pre-frontal leucotomy is selected for patients needing relief from morbid anxiety which has proved resistive to other methods of treatment. In the chapter on electric-convulsant therapy the Strauss-MacPhail

[1] "Recent Advances in Neurology and Neuropsychiatry", by W. Russell Brain, M.A., D.M. (Oxon.), F.R.C.P., and E. B. Strauss, M.A., D.M. (Oxon.), F.R.C.P.; Fifth Edition; 1945. London: J. and A. Churchill Limited. 8″ × 5″, pp. 377, with 32 illustrations. Price: 18s.

machine is described and figured—rather ingenuously—"not because we claim any special advantage for it over other apparatus, but because it is the one with which we are most familiar".

Indications for, complications of and results of convulsant therapy are fully discussed. The authors share the opinion generally held that vertebral crush fractures should rarely need a plaster jacket. Beyond hyperextension of the vertebral column by means of a small hard bolster in the small of the back, no special posture is adopted and no restraint, mechanical or manual, is applied.

Pick's and Alzheimer's dementias are discussed in the chapter on pre-senile dementias. In the latter condition there is a "diffuse degeneration of all cortical layers mostly affecting the frontal poles", but in a later paragraph the Alzheimer syndrome is stated to be a disease of the posterior parts of the hemispheres, while in Pick's dementias the disease process affects more the anterior parts. In fact the two syndromes are often very difficult to distinguish, clinically or pathologically. The encephalogram figured is from a case of pre-senile dementia, type not specified.

The functions of the hypothalamus, and sleep, normal and pathological, have a chapter each, as have also micturition and defæcation, the encephalitides and demyelinating diseases. With regard to the Kenny treatment of poliomyelitis, the authors state: "It may well be that advances in physical therapy springing from Miss Kenny's enthusiasm will outlive her theory and terminology."

Wernicke's encephalopathy is reviewed in some detail in the chapter on vitamin deficiencies. The value of vitamin *E* in neuromuscular disorders remains to be proved. With regard to peripheral nerve lesions, Walshe's criticism of Head's conclusions in the light of recent experimental work is given some prominence. According to Walshe's view, the sensory unit is not the specific end organ associated with any particular sense modality, but an organization of the impulses derived from a constellation of end organs in the area stimulated. One is reminded of the Gestalt theory in psychology which has replaced the idea of faculties. There have been renewed opportunities of studying nerve lesions and the means of assisting recovery of function in which autografts appear to have found an established place.

This work is, of course, specially intended for the post-graduate student, who will find the latest edition as useful as its predecessors in keeping him in touch with recent developments. It is difficult to strike a balance between an adequate review of current work and thought in a speciality, and meticulous references to recent papers. The authors' interests and personal experiences naturally lie in the medical and clinical fields of neurology. We feel sure that this edition will uphold the reputation gained by its predecessors.

VIRUS AS ORGANISM.

THE Edward K. Dunham lectures for the promotion of the medical sciences were delivered in 1944 at Harvard by Professor F. M. Burnet, Director of the Walter and Eliza Hall Institute of Research in Pathology and Medicine, Melbourne. They are now published in slightly expanded form under the title "Virus as Organism",[1] and the general viewpoint of the writer is well stated by the subtitle "Evolutionary and Ecological Aspects of Some Human Virus Diseases". He seeks to interpret present knowledge of these small particulate bodies in the light of their survival in nature, and to understand their place in biology.

There is good evidence to show that the virus particle is a degenerate descendant of larger pathogenic organisms, that it has lost the power of chemical synthesis, and so selects an environment in which that power is not needed for existence—it retreats within the protoplasm of the living cell. There, if the virus is to survive, it must attain a kind of balance between its own needs and the changes it produces in the host cell, and it must have a ready means of transfer to new hosts, and the host species must be abundant. The production of disease is a biological incident in the evolutionary stages of its existence.

Along these broad lines the writer surveys the host-parasite relationship—the physiological and the adaptive environmental reactions of each. Animal hosts seem to have been earlier in the history of the virus, then association between animal and man provided a further evolutionary change. When the virus encounters a host community with little past experience of infection, and therefore containing a large number of susceptibles, and the organism is a strain with a ready means of transfer, epidemic disease may well result. In the consideration of individual viruses, Professor Burnet points out that probably the greatest "biological success" has been attained by the virus of *herpes simplex*, where, although infection in early childhood is followed by considerable antibody formation, nevertheless the virus persists at or near the site of infection for the rest of the host's life; this beneficial equilibrium being disturbed only when other factors in the host allow the virus to produce the symptoms of disease.

Poliomyelitis is another disease in which only the unfortunate few amongst the infected develop its clinical form. There are similar infections in animals, such as Theiler's disease in mice, which furnish striking support and explanations of associated problems; indeed they have contributed largely to the understanding of persistence and spread of the virus.

Influenza, of course, is the virus of which Professor Burnet has made the greatest study, and in this chapter he speculates on the recently discovered variation of the virus from O (original) to D (derivative) form, on the practical question of the usefulness of prophylactic vaccination, and on the reasons for the occurrence of pandemics.

In his concluding chapter the author emphasizes the value to be obtained from the correlation of known facts to a common theory in such a complex field as that of infectious diseases, and the necessity for recognizing the part they may play in limiting excessive proliferation of animal, bird or indeed man.

This is an enthralling book. The great majority of medical readers are accustomed to the point of view which sees pathogenic microorganisms as the agents of death to the human race; he reflects little upon the fact that if the host is killed the parasite dies, too, that if large numbers of an infected population have clinical disease, they develop immunity against reinfection and the number of available hosts in a given community is reduced.

Mankind loves mirrors which reflect the image of things as they are; Professor Burnet takes us behind the looking glass, a little way down that enchanting passage, that evolutionary pathway along which the virus as an organism has moulded the lives of the creatures it has selected as its host.

[1] "Virus as Organism: Evolutionary and Ecological Aspects of Some Human Virus Diseases", by Frank Macfarlane Burnet, M.D., F.R.S.; 1945. Cambridge, Massachusetts: Harvard University Press. 8¼" × 5¼", pp. 144. Price: $2.00.

SURGERY FOR DENTAL STUDENTS.

"ESSENTIALS OF SURGERY FOR DENTAL STUDENTS" is a well presented and concise summary of those aspects of surgery which are of particular interest to dental students.[1] The book is well illustrated and produced.

Some of the author's ideas may be queried by dental authorities. For example, he still retains the dental cyst in the classification of epithelial odontomes. He uses the old term "myeloid epulis" instead of the more modern benign giant-cell epulis", and states that this growth arises from the alveolar bone marrow; many oral pathologists would dispute this source of origin. "Fibroid or fibrosarcomatous epulis" is classified synonymously with "fibrous epulis". In a modern textbook the use of the term "Riggs' disease", even as a synonym, is rather distressing. The statement that "the ramus and neck of the condyle are rarely fractured" is not correct, and in the Gillies method of elevating a depressed malar bone the periosteal elevator is passed deep to the temporal fascia and not through the subcutaneous tissue as is stated on page 129.

Carabelli's tubercle is not recognized as a manifestation of syphilis (page 229), and Figure 180 would appear to indicate that the lower permanent incisors, rather than the upper, demonstrate the classical formation of Hutchinson's teeth. The legend of Figure 151 indicates that the author's conception of "impaction" of wisdom teeth is not in accord with accepted dental teaching. The idea that "excessive dental use of cotton wool" is a local cause of gingivitis (page 45) surely requires some further explanation.

The chapters on non-glandular swellings of the neck and the cervical lymphatic glands are very clearly and ably set out and are excellent short summaries of these subjects.

[1] "Essentials of Surgery for Dental Students", by J. Cosbie Ross, M.B., Ch.M. (Liverpool), F.R.C.S. (England); 1945. Edinburgh: E. and S. Livingstone Limited. 8¼" × 5¼", pp. 292, with many illustrations. Price: 20s. net.

The Medical Journal of Australia

SATURDAY, MARCH 16, 1946.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE TREATMENT OF RHEUMATISM BY DEHYDRATION.

SOMETHING like 60% to 65% of the weight of the adult human body is accounted for by its water content; when this percentage is reduced there follow disturbances of metabolism, of the circulation and of renal function. D. A. K. Black, who reviewed this subject last year,[1] pointed out that a distinction exists between dehydration caused by primary loss of water, and dehydration in which the loss of water is secondary to a reduction in the total salt content of the body. He described the body water as being distributed in three compartments—the blood vessels, containing plasma; the tissue spaces containing interstitial fluid; and the cells, including the erythrocytes, containing intracellular fluid. Of the 65% of body weight of a man weighing 70 kilograms or 134 pounds, 5% is due to plasma, 20% to interstitial fluid and 40% to intracellular fluid; this is to say, of a total body fluid content of 46 litres, three would be plasma, 14 interstitial fluid and 29 intracellular fluid. While the capillary endothelium and the cell wall which separate the three compartments from one another are freely permeable to water, they have a selective permeability in regard to substances held in solution. Thus healthy capillary endothelium is relatively impermeable to protein, and plasma differs from interstitial fluid mainly in its high protein content. Black points out that body weight begins to fall as soon as the subject stops taking water; the loss in weight is greater on the first than on subsequent days. In three to four days of dehydration the loss in weight amounts to about 6% of the body weight, corresponding to 10% of the body water. Black, McCance and Young found that while the water content of the body fell about 10%, the electrolyte and urea content showed a slight increase, so that, distributed evenly over the smaller volume of body water, water loss would produce an increase in concentration of the same order as that directly observed. Black remarks that since the osmotic pressure of the plasma depends on the concentration of its osmotically active constituents and the plasma is in osmotic equilibrium with the other body fluids, there must be a progressive rise in the osmotic pressure of the body fluids during the period of water deprivation. In contrast to the sodium and chloride in plasma, the potassium level shows a slight fall and the urinary excretion of potassium rises during water deprivation. Since extracellular fluid has sodium as the main base, and intracellular fluid potassium, it is possible to deduce the proportion of extracellular and intracellular fluid lost from the body, by comparing the sodium and potassium balance after allowance has been made for changes in the blood concentrations. It has in this way been found that about two-thirds of the total water lost in water deprivation is lost from inside the cells—the body contains about twice as much intracellular as extracellular fluid, the water inside the cells contributes the same proportion of its volume as the water outside, and the loss of fluid is distributed over the whole volume of body water.

With these facts in mind we may turn to a report on the effects of artificial dehydration in rheumatism.[1] W. S. C. Copeman and L. G. C. Pugh have carried out an arresting piece of clinical research on patients suffering from fibrositis, acute and subacute articular rheumatism and sciatica. These authors explain that it is generally accepted that the pain in true fibrositis is associated with circumscribed areas of local tenderness called trigger points and that the symptoms can be relieved sometimes permanently by the injection of procaine into those areas. They find that painless nodules of the kind mentioned do not seem to signify rheumatism. They have recently examined 500 soldiers, and they found non-tender nodules equally in fibrositic and non-fibrositic subjects. However, tender nodules and trigger points were found in only 3% of men who did not give a clear history of fibrositis as compared with 30% in those who did. Unfortunately actual numbers are not given in regard to this observation. Copeman and Ackerman have shown that trigger points occur with great regularity in certain regions of the body and that these regions coincide with the distribution of basic fatty tissue which persists in emaciated bodies. Dissection of these areas of fatty tissue shows that they consist of lobules of fat lying within definite compartments with tough fibrous walls. The lobules do not appear normally to fill the space available within the compartments. Copeman and Pugh believe that in fibrositis an important factor in the production of pain and local tenderness is œdema in certain lobules and the development of tension as they swell and fill their compartments. They have found that this increase in size may lead to herniation if the fascial walls are partially deficient. In twenty cases of established fibrositis fat hernia of this kind were demonstrated at biopsy and their removal was followed by lasting relief of symptoms. On microscopic examination of the biopsy material no histological evidence of inflammation was found in the form of cellular infiltration, although macroscopically obvious œdema and congestion were present. Copeman and Pugh conclude that the swelling must have resulted from some process other than the classical inflammatory reaction. They thought that they might be able to reverse the process

[1] *The Lancet*, March 10, 1945.

[1] *The Lancet*, November 3, 1945.

by reduction of the fluid content of the affected tissues if they induced a clinical state of dehydration. This they did. They were concerned chiefly with fibrositis in the back in soldiers, but they included cases in which other parts of the body were affected. In these, trigger points were found in fibro-fatty tissue round tendon sheaths, bursæ and muscle insertions; they are included under the heading of chronic rheumatism. They also included in their observations patients suffering from acute or subacute articular rheumatism whose articular pain was referred from one or more trigger points near the joint. Some patients with sciatica due to prolapse of an intervertebral disk were included as well. Dehydration was carried out by three methods before a standard was adopted. The first method extended over four days, during which eight ounces of fluid were allowed each day with dry food. In the second method no food or drink was taken for twenty-four hours and the fluid output was increased by the administration of sodium sulphate at hourly intervals for six doses. In the third method the period was increased from twenty-four to thirty-six hours. In all cases preliminary dehydration was followed by an intravenous injection of fifty millilitres of a 30% solution of sodium chloride into one of the veins of the arm. Immediately after the injection the patient was allowed to drink four ounces of tea to mitigate thirst. Apart from this, no fluid was permitted for four hours, but at the end of the four hours all restrictions were lifted and the patient was encouraged to get up and move about. Copeman and Pugh explain that this work was planned as a physiological experiment. It was not anticipated that any relief of pain that might occur would be more than temporary. Certain patients, however, appeared to be cured, and the results have been analysed to show the potential therapeutic value of the procedure. For a result to be regarded as successful it was decided that improvement in functional activity and relief of pain had to be at least 75% of complete restoration. Of 22 patients with fibrositis, 13 registered a success and nine a failure; of 19 patients with chronic rheumatism, 13 registered a success and six a failure; of 28 with sciatica, 11 registered a success and 17 a failure. The result in sciatica is held to be due to a mechanism different from that operating in fibrositis—it is probably due to the effect of shrinkage of nervous tissue and the lowering of the pressure of cerebrospinal fluid.

This work should receive attention from clinician and laboratory worker. Copeman and Pugh explain that they were unable to secure a series of controls. Any future investigator of this method—and it is hoped that further investigations will not be long delayed—will secure a series of controls more easily than Copeman and Pugh could in their army work. It would be interesting if volunteers could be found for submission to experimental investigation of the fatty areas described by Copeman and Pugh to discover whether the condition of fibrositis with its typical pain could be produced. Since removal of these areas sometimes gives relief to persons affected by fibrositis, it might be possible to produce symptoms in persons who have these areas but complain of no symptoms. Further work may, as Copeman and Pugh suggest, advance our knowledge and treatment of rheumatic diseases. In the meantime dehydration may in selected cases find a sphere of usefulness as an empirical method of treatment.

Current Comment.

THE HEALTH OF THE PRE-SCHOOL CHILD IN AUSTRALIA.

In the issue of this journal of December 8, 1945, attention was drawn to a book by Dr. J. H. L. Cumpston and Miss Christine Heinig, which gave a description of the first five years' work of the six Lady Gowrie Child Centres—their design, equipment and purpose. Recently their health record has been "assembled" by Dr. F. W. Clements and Miss Margaret Macpherson.[1] The account covers the records of 1,289 children ranging in age from nineteen to seventy-two months at the time of their admission to the six centres, one of which exists in the capital city of each of the Australian States. A medical unit is attached to each centre, and it is obvious that the medical supervision of all children attending has been scrupulously careful and accurately recorded. Interruptions to the work of two of the centres occurred as a result of Japan's entry into the war; the Perth centre was closed for four months in 1942 and the Brisbane centre for the whole of that year. Further interruptions in the continuity of the records are of necessity occasioned by absence of children for any reason. The points particularly noted in the medical units of the centres were: growth (weight, sitting height, standing height), including possible seasonal variations in rate; chest circumference and the antero-posterior and lateral diameters of the chest; posture (by visual observation and by lateral and antero-posterior photographs); the presence of abnormal tonsils and adenoids; the presence of abnormal cardiac signs; the presence of abnormal pulmonary signs; the presence of strabismus; abnormalities of the ear; umbilical and inguinal hernia; dental caries; the nutritional status of the children; the incidence of illness; the causes of absenteeism. The high incidence of upper respiratory tract infections occasioned an investigation into the question whether the children attending the centres suffered more from these infections than children not attending centres. The investigation was undertaken at the Melbourne centre; a "control" group of children of comparable ages was observed as carefully as the rather difficult circumstances allowed, and it became obvious that children who did not attend the centres did not suffer the same incidence of upper respiratory tract infections as the centre children. This was so, in spite of the rigid precautions taken to exclude from the centres any children who seemed likely to be sources of infection of any type; the same care was taken with the members of the staff. Of course, the reasons for this state of affairs are fairly obvious; not all the blame can be attached to the congregation of children of similar age groups, for there are many hours during the week when the children are free to mingle with older brothers and sisters, parents and friends.

Clements and Macpherson have faced and answered the question whether the centres have fulfilled the more important of their functions—to benefit the children. In spite of some contrary evidence, the answer is an unqualified affirmative. Not the least of the benefits conferred on children attending the centres is that of companionship. From the nutritional point of view, the provision of a midday meal, properly balanced and prepared, has been of enormous value. Not only have many of the children been provided with essential food elements which they would otherwise have lacked, but also a step forward has been made in a number of instances in the education of parents on matters of nutrition and hygiene. The problem of the child who will not eat has been tackled, and many such children have been cured of their bad eating habits. Naturally there were failures, most of them arising from lack of home cooperation and from irregular attendance at the centre. Some mothers saw no difficulty, because the

[1] "The Lady Gowrie Child Centres: The Health Record", assembled by F. W. Clements, M.D., and Margaret Macpherson, B.A.; 1945. Canberra: Commonwealth of Australia, Department of Health. 11" x 8½", pp. 73, with illustrations.

child ate well at home; but what he ate was immaterial—one child drank no milk, but always drank two bottles of cordial before going to bed. It is a tribute to the tact and persistence of the staff at this child's centre that he was finally asking for milk at home. The regular medical supervision has resulted in the rectification of many slight physical aberrations and some more important conditions; but, again, some of the parents did not act on the advice given by the centre's medical unit, so that their children remained untreated. The inclusion of a rest or sleep period in the centre's programme means that the children do not miss their daytime rest; records of sleep or rest were kept and have proved of value in the study of the children. Clements and Macpherson recognize the statistical inadequacy of the findings made up to date, but believe that the work is worthy of extension. No better opportunity presents itself for the study of the pre-school child than through these centres. But Clements and Macpherson believe that the most important function of the centres is the provision of medical supervision and facilities for social adjustment; the midday meal and the rest period they hold to be of secondary importance. Let them outline in their own words their hopes for the future:

> We feel we cannot over-emphasize the importance of extending the service to the whole family. The parents must be brought more and more into the programme and the health service must be extended to include the elder brothers and sisters. The family must become the unit if the best work is to be achieved.
>
> We would urge that, just as the Lady Gowrie Centres were built as demonstration units to test the ideals and standards of pre-school child care, so should a family unit—some type of community centre—be built. These units should not provide facilities for either a midday meal or a sleep period for the pre-school child, but should enable full medical supervision to be maintained and should provide facilities for social adjustment of the children.

It is obvious that the Lady Gowrie Child Centres have, even in their first five years, provided not only casual benefits to the children attending them, but information, however incomplete, that will ultimately benefit pre-school children in general. The work, up to the present so carefully recorded, should be extended, for it provides the foundation for an important and interesting piece of research.

CONGENITAL AFIBRINOGENÆMIA.

RARELY is the blood completely devoid of fibrinogen, but this lack does occasionally occur and causes a tendency to prolonged and persistent hæmorrhage. The condition may be congenital, when symptoms date from soon after birth, or it may be acquired. Examples of the acquired form have occurred in diseases that grossly interfere with the probable sites of formation of fibrinogen, for example, tuberculous infiltration of the liver and widespread metastatic carcinoma.

J. L. Henderson, G. M. M. Donaldson and Harold Scarborough have recently reported a case of congenital afibrinogenæmia and have reviewed the only other six cases that have been reported in the literature.[1] All of the patients were children, and the bleeding tendency was noted at birth or during the first few days of life. In the child whose illness is described in detail oozing from the umbilicus commenced on the third day of life and could be arrested only by blood transfusion. During the eleven years of his life he was admitted to hospital on eleven occasions for epistaxis, a bitten tongue, shedding of milk teeth, a lacerated knee, ulcerated lips or extraction of carious teeth. On six occasions blood transfusion was necessary to stay the hæmorrhage, and on the other five it subsided spontaneously. Less severe bleeding or bruising occurred on many occasions. The risk of death is considerable, for of the seven patients four died while still children. Unlike hæmophilia, to which it bears a close resemblance, the disease affects both sexes. Consanguinity of the parents is probably a significant feature, for the parents were first cousins in three of the seven cases reported. In each of two cases, the patient had a sister die of umbilical hæmorrhage in the neonatal period. The cause of this hæmorrhage was not investigated, but it was probably a fibrinogen lack. The sister of the authors' patient died, although treated with vitamin *K*, which usually checks the more common hæmorrhagic disease of the newborn that is caused by a prothrombin lack. Investigation of the blood in these seven reported cases showed no fibrinogen at all; no clot formed after many hours in attempts to determine the clotting time of the blood; the bleeding time was prolonged in some cases, but normal in others; the blood platelets were usually normal in number, but in two patients an intermittent thrombocytopenia occurred; the leucocytes were not significantly altered and the level of the red blood cells was affected only by recent hæmorrhage.

In addition four cases have been reported of adults who had suffered from a hæmorrhagic tendency throughout life and whose blood fibrogen level was low, and in three of whom there was a family history of bleeding. This condition is described by the name congenital hypofibrinogenæmia.

It is probable that congenital afibrinogenæmia is more common than the literature suggests, and that it is the true cause of the bleeding of some of the children regarded as hæmophiliacs and of some of the babies who die of hæmorrhagic disease of the newborn. It is especially in regard to this latter group that the condition should be kept in mind, for since it has been known that neonatal bleeding is usually due to a prothrombin lack, many such infants have been treated successfully with vitamin *K* instead of by blood transfusion or by the intramuscular injection of blood. The essential treatment of any patient in whom the cause of the bleeding is a lack of fibrinogen is transfusion of whole blood or of plasma from which the fibrinogen has not been removed.

[1] *The Quarterly Journal of Medicine*, April, 1945.

THE PREVENTION OF SUNBURN.

DURING the recent war a great deal of scientific research was carried out secretly and care was taken that results likely to help in the winning of the war were not made public. One investigation of this kind in America had to do with the prevention of sunburn by the use of skin coatings. The work has now been described by M. Luckiesh, A. H. Taylor and T. Sollmann.[1] The research was undertaken at the request of the air force of the American Army. Some protection was needed for men marooned on life rafts or in the desert following air crashes. These men often lost a great deal of clothing and were subjected to severe exposure to the sun's rays. The substance that was to be used as a protection had to be non-toxic and might be either bacteriostatic or bactericidal. It had to afford the maximum amount of protection per unit weight or per volume; it had to be stable to heat or cold, and free from rancidity; it would be useless if it was easily washed off the skin. Two of the authors had previously investigated the production of erythema and had found that most of the erythema produced by natural sunlight resulted from ultra-violet energy of a wave-length shorter than 3,200. Several preparations were selected for investigation. The most suitable was found to be "dark red vet. petrolatum", a substance prepared by the Standard Oil Company of New Jersey. It was found to be opaque to rays causing erythema, and it served as a complete protection to the skin in an exposure equivalent to twenty hours of the strongest sunlight. Excellent protection was also given by phenyl salicylate (salol) put up in a 10% cream; it is non-toxic. This work, so valuable in war, is of importance in peace time in this country where strong sunlight has injurious effects on the skin.

[1] *The Journal of the American Medical Association*, January 5, 1946.

Abstracts from Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Phage Typing of Staphylococcus Aureus.

G. S. WILSON AND J. D. ATKINSON (*The Lancet*, May 26, 1945) have carried out typing of staphylococci by the bacteriophage method. Using a modification of Fisk's method of isolating phage from cultures and then cross-testing the parent culture with purified phage, they recognized fourteen different types of phage, and three of these had subtypes. Two hundred and seventy-eight strains of staphylococci were then tested for their susceptibility to phage action, and 60·4% of these were typable, 22·6% were acted upon by phage, but were not classifiable, and 17% were not susceptible to phage. Investigations in food poisoning epidemics are quoted in which phage typing enabled the specific staphylococcus to be identified from amongst numerous coagulase-positive staphylococci present in suspected persons; this being the purpose for which phage typing is of greatest practical value.

Bacteriostatic Effect of Human Serum on Group A Streptococci.

SIDNEY ROTHBARD (*The Journal of Experimental Medicine*, August, 1945) has searched for type-specific antibodies in the serum of patients convalescing from Group A streptococcal pharyngitis. Specimens of serum were collected at intervals from two patients with scarlet fever, and from one in a relapse of rheumatic fever. Streptococci from the throats were types 6, 19 and 26 respectively. The test consisted of determining the ability of the serum to sensitize homologous or heterologous type streptococci to the action of leucocytes in whole blood. Mixtures of varying dilutions of culture, test serum, and fresh blood were sealed and rotated in small tubes for three hours, and then a fixed amount was spread on a rabbit blood agar plate and incubated for 18 to 24 hours; counts were made. Bacteriostatic antibodies first appeared between three and five weeks following infection, did not attain maximum concentration till convalescence was well advanced, and persisted for a long period. Many homologous strains from sources other than the patient reacted identically when treated with the patient's serum, and absorption experiments with heat-killed streptococci confirmed the specificity of the antibodies present in it. Fractional tests with M and T antigens suggested that M was the one concerned. The technique presented difficulties which the author thought could be overcome in view of the usefulness of the results gained.

Proteolytic Enzyme in Group A Streptococci.

STUART D. ELLIOTT (*The Journal of Experimental Medicine*, June, 1945) has studied a proteolytic enzyme produced by Group A streptococci, with special reference to its effect on the type specific M antigen. It was noticed that while some cultures grown at 37° C. could not be identified in the ordinary way, certain of them when grown at room temperature yielded extracts in which type specific M substance could be readily identified. Search was made for a substance which destroyed the serological activity of the M antigen at 37° C. From one of the cultures an active extract was prepared, which when added to another culture already identified, destroyed the serological reactivity known to be present. The destruction of the M substance proceeded most rapidly at pH 8·0; there was little effect at pH 4·0. A concentrated enzyme solution was prepared, and it was found that the presence of living bacterial cells was necessary for its action and that it attacked other substrates such as casein and gelatin, and human and rabbit fibrin. Mouse passage of the parent strain enhanced its virulence and inhibited production of the enzyme. The enzyme is inactivated by iodoacetic acid, and by normal rabbit and mouse serum.

Transformation of Pneumococcal Types.

MACLYN MCCARTY (*The Journal of Experimental Medicine*, May, 1945) has studied the reversible inactivation of the substance inducing transformation of pneumococcal types. It was noted that during isolation of the transforming substance, addition of ascorbic acid abolished its biological effect, although there was no apparent change in its physical properties. A group of substances was then studied, including hydroquinone and phenanthrene, which were shown to have a similar effect. The reaction was catalysed by cupric ions, and prevented by the presence of sulphhydryl ions. A study of the mechanism of the reaction led to the conclusion that there is a liberation of peroxide which in turn oxidizes certain groups in the biologically active molecule, which then becomes inactive. The reversal of the effect can be achieved by the addition of sulphhydryl groups.

Penicillinase.

H. PROOM (*The British Journal of Experimental Pathology*, April, 1945) has made some observations on penicillinase. He prepared the sustance from a paracolon bacillus, the organism being grown for seven days in large amounts of papain digest broth and filtered off, the enzyme in the filtrate being used for testing after further filtration through a Seitz disk. Tests were set up to determine the activity of the final solution by using diluted penicillin and an inoculum of 200,000 Oxford staphylococci, and carrying out incubation for three days. One millilitre of the filtrate would just permit growth of this inoculum in six millilitres of Wright's broth containing ten units of penicillin. The active substance was then concentrated by saturation with ammonium sulphate, and after centrifugalization, the precipitate was dissolved in distilled water. It was heat labile, being inactivated after one hour at 80° C.; it was stable at pH 3·0 and 7·6; and was inactivated at pH 11. It was precipitable by alcohol, and probably a protein. The longer a culture was grown, the more penicillinase it could produce. In a test of the reaction between penicillin and penicillinase four factors were involved: the rate of inactivation of penicillin, the rate of killing of the inoculum by penicillin, the rate of inactivation of penicillinase, and the order of mixing the reagents all seemed to play a part. It was not clear whether the reaction was wholly enzymatic or not. The penicillinase was found very suitable to add to high concentrations of penicillin, so that they might rapidly be tested for sterility, with particular regard to the identification of tetanus spores.

Immunological Studies in Subacute Bacterial Endocarditis.

MAX GROLNICK AND LEO LOEWE (*The Journal of Laboratory and Clinical Medicine*, July, 1945) have made a series of immunological studies in patients with subacute bacterial endocarditis treated by the combined penicillin-heparin method. This consisted in continuous intravenous infusion of penicillin in saline solution, sufficient "to render the blood sterile", and heparin was given either subcutaneously or added to the infusion. The first study was directed towards cutaneous phenomena produced by the drug, and to intracutaneous and ophthalmic tests; diluted penicillin solutions were used and an extract of *Penicillium notatum* containing from 0·01 to 0·1 milligramme total nitrogen; and a saline solution control was used. Seventy-five normal control subjects and 23 patients were observed over several months, many tests being repeated, during and after treatment. No evidence whatever was obtained of the development of any reactivity or sensitivity, either to penicillin or extracts of *Penicillium notatum* in either patients or controls.

Dangerous Carriers of Hæmolytic Streptococci.

MORTON HAMBURGER, JUNIOR, MARGARET J. GREEN AND VIRGINIA C. HAMBURGER (*The Journal of Infectious Disease*, July-August, 1945) have studied the problem of the dangerous carriers of hæmolytic streptococci. The number of organisms expelled by carriers with "positive" and "negative" nose and throat cultures was estimated in 400 army patients by pinning a small cotton "patch" on the bottom sheet of the bed for twenty-four hours, shaking it up in broth, and then plating aliquots on blood agar containing one part of gentian violet in 750,000, incubating the plates and making colony counts. It was found that from patients whose nasal secretions yielded positive cultures, approximately 80 times as many hæmolytic streptococci could be recovered, as from those whose nasal culture yielded no streptococci. Further, 90% of patients dispersed very few organisms by the tenth day of either scarlet fever or streptococcal tonsillitis, and the organisms of those with heavy nasal infections persisted longest. In the general population in the camp the ratio of throat carriers to nose carriers of hæmolytic streptococci was 4:1. Patients who had associated sinusitis remained carriers much longer, but no particular serological type of streptococcus could be detected.

Bacterial Endocarditis and Penicillin.

ARTHUR L. BLOOMFIELD, CHARLES D. ARMSTRONG AND WILLIAM M. KIRBY (*Journal of Clinical Investigation*, May, 1945) have investigated the treatment of subacute bacterial endocarditis with penicillin, selecting for study patients in whom the organism recovered from

the blood stream was found sensitive to a concentration of 0·1 unit per millilitre *in vitro*, who had no evidence of heart failure, and who could be treated in hospital for six to eight weeks. Dosage of the drug was 200,000 to 300,000 units per day given intravenously for three weeks, and thereafter by eight intramuscular injections for three to five weeks. No heparin was used. The immediate effect of treatment was subjective improvement of the patient, followed by fall in the patient's temperature in eight out of eleven instances. Blood cultures before long could not be grown. Petechiæ frequently continued to appear in spite of this, and some embolic phenomena occurred also. Two patients were febrile for longer periods, one patient died of cardiac failure though afebrile, and one died on the fourth day of treatment. Seven patients were clinically cured, though renal lesions, as indicated by regular study of urinary sediments, were still present. The authors maintain that unless organisms in a given patient are proved sensitive to the action of penicillin, it is not worth while attempting treatment. They believe that the long period of treatment, within limits, is more important than the size of the daily dose of the drug.

HYGIENE.

Triethylene Glycol Vapour in Hospital Wards.

MORTON HAMBURGER, JUNIOR, THEODORE T. PUCK AND O. H. ROBERTSON (*The Journal of Infectious Diseases*, May-June, 1945) have studied the effect of triethylene glycol vapour on airborne β hæmolytic streptococci in hospital wards. They used a vapourizing device which kept a moderate fog in the wards at all times, carrying about 0·01 milligramme of triethylene glycol vapour per litre of air. The presence of β hæmolytic streptococci was determined by sucking a measured amount of air through broth, and then plating aliquots in blood agar plates containing one part of gentian violet in 500,000, and also by the use of "settling plates" exposed for varying times in the wards. Five sets of tests were performed in scarlet fever wards, over two monthly periods, with control periods when no triethylene glycol vapour was present. The mean reduction in the number of hæmolytic streptococci recovered was 65%, the figures obtained from settling plates being less favourable than those from air analyses; the cross infections discovered in the patients diminished markedly. The findings in this study are appreciably less than in laboratory studies, in which complete killing of bacteria can be ensured. The reasons for this were thought to lie in the fact that dried dust particles from bedclothes are much less penetrable to the glycol vapour and they may be of such size that effective concentrations of the vapour cannot concentrate around them.

T. T. PUCK, MORTON HAMBURGER, JUNIOR, O. H. ROBERTSON AND VALERIE HURST (*The Journal of Infectious Diseases*, May-June, 1945) have studied further the combined action of glycol vapour and dust control methods on airborne β hæmolytic streptococci in hospital wards. The plan of the previous experiment was repeated with the addition that floors were treated with a solution of urea, 5%, ninol, 3%, and roccal, 1%; and bedclothes, pyjamas and bathrobes were treated with a 2% oil emulsion. Efforts were also made to avoid the production of a fog in one of the wards used, although the glycol vapour was still held at an effective level. Observations were carried out during quiet periods, and during bedmaking. In the first ward the addition of dust control eliminated completely the hæmolytic streptococci during quiet periods, and less than five per ten cubic feet of air were found when beds were being made; for the control periods the figures were ten per ten cubic feet of air during quiet periods, and 105 during bedmaking. Dust control alone effected a marked reduction in the number of hæmolytic streptococci recovered, but the addition of triethylene glycol vapour improved the results further. The total number of organisms in the air was decreased, but not so markedly as the hæmolytic streptococci. The vapour concentrations set at a level below the fogging point were as effective as a supersaturated atmosphere. The authors believe that these methods are practicable, and offer a means of controlling airborne infections in hospital wards.

Prevention of Tuberculosis.

D. M. GIBSON (*The Canadian Medical Association Journal*, October, 1945) presents the results of a survey from the public health angle of 1,000 recent admissions to the Toronto Hospital, Weston, on account of parenchymal pulmonary tuberculosis. No less than 520 of the patients were aged over thirty years. In the age groups under thirty-one years, women preponderated; in the higher age groups men were more numerous than women, especially in the group aged over fifty years. *Mycobacterium tuberculosis* was found in the sputum or gastric contents of 714 of the subjects; in 434 of these instances the organisms were found on direct examination of a smear of the sputum and in another 151 on concentration. Cough was a common finding, and occupational opportunities for infecting other people were plentiful. The author points out that pulmonary tuberculosis is a disease of all ages. From the point of view of prevention, there seems to be an urgent need to discover actively infective patients in the higher age groups at an earlier stage than is often the case at present. In the presence of suspicious symptoms the author urges more alacrity in advising an X-ray examination of the chest. He believes that an extension of the mass survey method is imperative.

An X-Ray Survey of Healthy Troops in Canada.

R. W. BOYD (*The Canadian Medical Association Journal*, January, 1946) states that during 1944 the incidence of tuberculosis was found to be rising in the Canadian army overseas, though no similar rise was detected in troops remaining in Canada. It was decided to conduct a random chest X-ray survey of healthy military personnel in Canada. More than 5,000 soldiers were chosen for examination; all were aged under thirty-five years, had served in Canada continually for eighteen months or more, and had not been radiologically examined during this period. The subjects were chosen at random from the various home war establishments; many were of low category, but none was considered to have active chest disease; each was apparently healthy and able to carry out his work. Single films were taken, 14 inches by 17 inches in size. The findings were as follows (5,200 subjects): active pulmonary tuberculosis, three cases; suspected minimal tuberculosis, eight cases; fibrotic or semicalcified lesions present at enlistment, no change in 28 cases, further resolution or healing in six cases; gross hilar or parenchymal (Ghon) calcification, 59 cases; subacute non-tuberculous pleurisy, one case; pleural thickening and adhesions, (*a*) diaphragmatic (sulcus obliteration), 106 cases, (*b*) apical, four cases, (*c*) interlobar, four cases; progressive heart disease, two cases; atypical pneumonitis or basal infection, four cases; spontaneous pneumothorax, one case; eventration of the diaphragm, one case; the presence of residual lipiodol, two cases. The author concludes that the incidence of unrecognized tuberculosis revealed was less than one per 1,000, and that the findings indicate the need for periodical re-survey of subjects. No evidence was found to indicate that minimal healed lesions or primary complexes incompletely calcified are aggravated as the result of military service.

Streptomycin and "Promin" in Experimental Tuberculosis.

M. I. SMITH AND W. T. MCCLOSKY (*Public Health Reports*, September 28, 1945) have investigated the chemotherapeutic action of streptomycin and "Promin" in tuberculosis of guinea-pigs. Two sets of experiments were made, the first to determine whether streptomycin had any ameliorating effect, and the second to ascertain its value as compared with "Promin". Streptomycin is a substance isolated by Waksman and co-workers from *Actinomyces griseus*, and has antibiotic properties against the tubercle bacillus. "Promin" is sodium p-p′ diaminodiphenylsulphone N-N′ didextrose sulphonate. The authors found that the daily intramuscular injection of 5,000 units of streptomycin over a period of ninety days in guinea-pigs infected with a human strain of tubercle bacilli produced a chemotherapeutic effect superior to that obtained with 0·5 gramme per kilogram of "Promin" administered orally each day over the same period. Since the dose of "Promin" used was about half the maximum tolerated dose, while that of streptomycin was less than one-twentieth of the maximum tolerated dose, it appears that streptomycin has a chemotherapeutic index better than ten times that of "Promin". The authors believe it possible that by an increase in the dose of streptomycin and by better methods of administration, its chemotherapeutic effectiveness may be enhanced. In one group of guinea-pigs combined treatment with streptomycin and "Promin" was given; 5,000 units of streptomycin were given each day intramuscularly, and 0·5 gramme of "Promin" per kilogram was given by mouth daily. The authors state that in this group the results were better than any previously obtained under experimental conditions.

British Medical Association News.

SCIENTIFIC.

A meeting of the New South Wales Branch of the British Medical Association was held on September 20, 1945, at Sydney Hospital. The meeting took the form of a series of clinical demonstrations by members of the honorary medical staff of the hospital.

Hypertensive Arteriosclerosis with Retinal Changes.

Dr. E. H. Stokes showed a man, aged forty years, suffering from hypertensive arteriosclerosis with retinal changes. The patient had been discharged from the army on April 13, 1942, after two years' service overseas. Apart from his defective eyesight, he complained of frequency of micturition due to polyuria and of dull, generalized headache. He had been a heavy drinker. With regard to his previous health, he had suffered from febrile attacks which he thought were caused by influenza, and while on active service he was incapacitated by sandfly fever. There were no points of importance in the family history.

On examination of the patient, it was noted that his general condition was good. The cardiac apex was not palpable and the aortic second sound was accentuated. The blood pressure readings were 270 millimetres of mercury, systolic, and 170 millimetres, diastolic. The urine contained a heavy cloud of albumin (0·25%); but only an occasional red cell and a few leucocytes and granular casts were found in the centrifuged specimen. The blood urea nitrogen level was 22 milligrammes per 100 millilitres and the blood creatinine content was 1·5 milligrammes per 100 millilitres. The blood urea clearance was 27 millilitres per minute (53% of standard clearance). The urea concentration test gave the following result: before the intake of urea, the percentage of urea in the urine was 1·3 (volume 140 millilitres). One, two and three hours after the ingestion of urea the figures were 1·4% (volume 132 millilitres), 1·5% (volume 112 millilitres) and 1·6% (volume 86 millilitres). The blood count gave results within normal limits, and the blood serum failed to react to the Wassermann test. Changes were observed in the ocular fundi. The arteries and arterioles were thin, the veins were "nipped", and numerous exudates and recent hæmorrhages were present. In the electrocardiogram flattening of the *T* waves in all leads was suggestive of myocardial aortic degeneration. On radiological examination of the heart left ventricular and aortic enlargement was noted. An interesting feature was the presence of numerous fibrolipomata in various parts of the body.

Dr. Stokes said that although the ability of the kidneys to concentrate urea and to clear urea from the blood was impaired, he considered that the retinal changes were due to hypertensive rather than renal disease.

Gastric Syphilis.

Dr. Stokes next showed a man, aged sixty-one years, who had first been examined in 1938, when he was suffering from an anxiety state. At that time it was noticed that his tongue was ulcerated at the edges, and that small patches of leucoplakia suggestive of specific infection were present. His blood serum yielded a completely positive reaction to the Wassermann test. Potassium iodide and mercury were prescribed. He was not examined again until December, 1941, when he complained of nervousness and headache. Glycosuria was found, and the glucose tolerance test produced a mild type of *diabetes mellitus* curve. The condition of the tongue had recurred, as he had not adhered to treatment.

On June 26, 1944, he complained of "indigestion" and a sensation of fullness after food. In September he suffered from an aching pain in the epigastrium. A barium meal examination showed the lumen of the middle third of the stomach to be narrowed. Achlorhydria was noted. Gastroscopy could not be performed, owing to the small size of the stomach. Antispecific treatment (consisting of arsenicals, bismuth, mercury and iodides) was given, but as no obvious improvement occurred, a laparotomy was performed by Dr. R. M. Rawle in December, 1944. A large, rounded mass was found on the lesser curvature of the stomach. No attempt was made to remove it because of the extensive involvement of the stomach. Unfortunately no biopsy was made. Antispecific treatment was continued, but the abdominal mass continued to increase in size, and in May, 1945, a large sausage-shaped tumour was palpable extending across the upper part of the abdomen. X-ray examination showed the lumen of the stomach to have become progressively smaller; but in spite of that condition, the abdominal mass had decreased in size and the patient's general condition had remained good. Dr. Stokes said that owing to the size of the stomach he was able to ingest only small meals. Treatment with a mixture containing potassium iodide (30 grains) and *Liquor Hydrargyri Perchloridi* (one drachm) was being continued. The blood serum now failed to react to the Wassermann test. Dr. Stokes remarked that it was impossible to say definitely that the patient was not suffering from carcinoma of the stomach; but his general condition was in favour of a luetic condition. Plastic induration of the stomach (*linitis plastica*) could arise from both newgrowth and syphilis.

Pulmonary Tuberculosis Treated by Artificial Pneumothorax.

Dr. Stokes then showed a woman, aged twenty-seven years, who in 1932 had suffered from right-sided pulmonary tuberculosis. Artificial pneumothorax had been induced, but after about a year an effusion formed which was aspirated. Adhesions formed between the visceral and parietal pleura, and the heart and mediastinum were displaced to the right. In 1935 the right phrenic nerve was crushed and paralysis of the diaphragm was produced. As the years progressed the right side of the patient's chest became retracted and the movement impaired. At the time of the meeting the cardiac apex was displaced to the right, and bronchial breathing could be heard below the right clavicle, owing to the displacement of the trachea to the right. Dr. Stokes said that he had shown this patient at earlier clinical meetings, but he considered that it would be of interest to the members to see the patient again, as the pneumothorax and the adhesions had produced an effect similar to that of thoracoplasty.

Tuberculous Sinuses.

Dr. Stokes's last patient was a man, aged forty-four years, whose right kidney had been removed in 1936. When examined on August 26, 1943, he was suffering from enlargement of both epididymes, probably due to tuberculous disease. A sinus was present to the right of the anus. He also suffered from a paroxysmal cough. Dulness to percussion, bronchial breath sounds and crepitations were found at the apex of the left lung posteriorly. On X-ray examination of the chest infiltration of the upper lobes of both lungs suggestive of tuberculosis was found. The sputum contained numerous acid-fast bacilli, and the patient reacted to the Mantoux test. The erythrocyte sedimentation rate (by Westergren's method) was 68 millimetres in an hour. After a few months the epididymes became smaller. On November 2, 1944, it was decided to administer a course of old tuberculin, commencing with 0·1 millilitre of a dilution of 1 in 10,000. The patient's weight was ten stone eight pounds. On June 14, 1945, it was noted that a tuberculous cold abscess had formed in the perianal region, and that several sinuses and fistulæ were present. These were injected with cod liver oil on nine occasions. The amount of discharge from them lessened. On August 24, 1945, a bacteriological examination of this discharge was made for the first time. No acid-fast bacilli were found in the smears, but numerous pus cells and Gram-positive and Gram-negative bacilli (some extracellular) were present. The erythrocyte sedimentation rate was 28 millimetres in one hour. The last tuberculin injection was 0·4 millilitre of a 1 in 10 dilution. Dr. Stokes said that the condition of the patient's lungs had remained practically unchanged during the past two years, and the anal and genital condition had shown improvement. It was proposed to continue with the tuberculin treatment.

Clinical Photographs.

Dr. Stokes then showed a series of clinical photographs. Leprosy, Paget's disease, achondroplasia, pigeon breast and Harrison's sulci, retraction of the chest wall after pneumothorax therapy, obesity probably due to hypothalamic disorder, masculinization associated with carcinoma of the adrenal gland, silicosis (X-ray films) and carcinoma of the sigmoid colon (X-ray films) were the subjects illustrated.

Electrocardiograms.

Dr. Stokes finally showed electrocardiograms characteristic of the following conditions: complete heart block in a man who suffered from Stokes-Adams attacks; partial heart block produced in a patient by the administration of digitalis erroneously given under the impression that his heart was diseased, and the normal electrocardiographic tracing of the same patient taken ten days after the cessation of digitalis

treatment; auricular and ventricular premature contractions; left axis deviation; left ventricular hypertrophy with anterior cardiac infarction; left ventricular hypertrophy with anterior cardiac infarction and nodal premature contractions; left ventricular hypertrophy with myocardial degeneration; posterior infarction.

Wilms's Tumour.

DR. A. C. TELFER showed a girl in good health, aged two years and four months, who in December, 1944, had undergone a right nephrectomy. The patient had been brought to the hospital suffering from pneumonia, and a huge renal tumour occupying the whole right side of the abdomen was found. The tumour extended from the right side of the diaphragm to the left side of the umbilicus and into the bony pelvis. A diagnosis of Wilms's tumour was made and deep X-ray therapy was commenced. The dose by ionometer was 3,200*r*, extending over a period from September 27 to October 19, 1944. Nephrectomy was performed six weeks after the last treatment.

Dr. Telfer said that no difficulty was experienced in removing the greatly reduced renal tumour. It was only slightly adherent at the upper pole. Microscopic examination of sections of the tumour revealed that no cellular elements were left after deep X-ray therapy. Dr. Telfer said that Willis had stated that in Wilms's tumour secondary extension occurred through veins to the liver, the lungs and also the lymph glands. At the time of the meeting the child was well and showed no evidence of metastases.

Carcinoma of the Bladder with Bilateral Transplantation of the Ureters.

Dr. Telfer then showed a male patient, aged forty-three years, who in December, 1942, had undergone transplantation of both ureters into the sigmoid colon; the patient had what was later microscopically found to be an alveolar carcinoma arising from the transitional epithelium of the bladder mucosa. There was a twelve-day interval between the last transplantation and a subtotal excision of the bladder. Dr. Telfer said that, although the procedure of extraperitonealizing a knuckle of colon was rather more tedious, it lessened the risk of peritonitis. He said that there was a great advantage in operating on one side at a time, in that it did not produce such a shock to the renal mechanism as would simultaneous bilateral transplantation.

Dr. Telfer went on to say that at operation the growth was thought to be invading the perirectal tissues. Nevertheless, it was interesting to see a man who had no trouble with his urinary system at the time of the meeting, who was fit and at full work, and who had no evidence of metastases two years and nine months after subtotal cystectomy.

Adrenal Virilism.

Dr. Telfer then showed a patient of Dr. R. M. Rawle's, who had a carcinoma of the left adrenal gland. The diagnosis of carcinoma was made at laparotomy by Dr. Rawle, who discovered a huge inoperable tumour of the left adrenal gland with metastases in the liver. Biopsy at laparotomy was of no assistance, as it failed to reveal the essential structure; the specimen consisted mostly of necrotic material. The woman, aged forty-one years, had two healthy, adolescent children. She had noticed that five or six years earlier she had lost her menstrual periods, and at approximately the same time she had noticed hair appearing, first on the stomach, then on the breast, chest and back, and lastly on her face. The increased growth of the tumour caused shortness of breath, flatulence, weakness and lassitude. It was only three months prior to her admission to hospital on April 17, 1945, that she had noticed a swelling on the left side of her abdomen. She had lost two stone in weight in that period. Her past and family history contained nothing of significance. The results of pathological tests were of no significance, except for the estimation of 17-ketosteroids, the urinary content of which on April 17 was 296 milligrammes per litre, the twenty-four hour volume being 440 millilitres.

Dr. Telfer said that the most interesting feature of this case, apart from the extraordinary clinical manifestation of adrenal virilism, was the effect of deep X-ray therapy on the excretion of 17-ketosteroids in the urine. The course of deep X-ray therapy was instituted on May 17 and continued to June 20; it reduced the 17-ketosteroids on July 16 to 87 milligrammes per litre, the twenty-four hour volume of urine being 1,570 millilitres. The patient's condition was clinically much improved. The tumour had been reduced in size, and at the time of the meeting the symptoms were greatly ameliorated. Dr. Telfer hoped that the fall in the urinary 17-ketosteroids, indicating as it did destruction of the adrenal cells producing these substances, might also indicate destruction of the malignant cells of the gland.

Peroneal Muscular Atrophy.

DR. H. L. SPEARMAN showed a male patient, aged twenty-nine years, who had complained of weakness in the legs intermittently for ten years, but much more severe in the last four years. It occurred in both legs, but the right leg always seemed the more severely affected. It affected the patient in running, when the knees seemed to "go", and bent, but did not cause him to fall. Sometimes lately he had noticed a twitching in the thighs and a tendency for the right arm to be weak. His father was weak, but there was no family history of the disorder.

On examination of the patient, his gait was normal, and he exhibited wasting in the lower thirds of both thighs and legs, most pronounced in the vasti muscles, which were flaccid. No abnormality of note was detected in the heart, lungs or abdomen, the blood pressure was 130 millimetres of mercury (systolic) and 90 (diastolic), and the thyreoid gland appeared normal. No myasthenic reaction was present, and examination of the nervous system revealed no other abnormality than absence of the right ankle jerk and fibrillation in the muscles of the right thigh.

Dr. Spearman said that the condition was a neuritic type of muscular atrophy with a familial tendency, tending to be arrested at about the fourth decade, and due to primary neurone atrophy of the anterior horn cells and some of the afferent neurones in the cord. Fibrillation occurred if the disease was active. Cycling appeared to be the most effective form of treatment.

Fracture of the Pelvis Complicated by Intrapelvic Rupture of the Urethra.

DR. S. L. SPENCER first showed a wharf labourer, aged forty-three years, who on July 28, 1945, had sustained a lateral crushing injury at hip level. He collapsed with pain in the back, the lower part of the abdomen and the perineum, and was uncertain whether he had tried to pass urine. He had emptied his bladder about one hour before the accident. He was admitted to hospital in a condition of shock two hours after the accident. There were clinical signs of a fractured pelvis. After resuscitation treatment a catheter was passed and a few ounces were recovered of what appeared to be blood-stained urine with the blood fraction predominating. As the catheter had been passed without difficulty, a provisional diagnosis of extraperitoneal rupture of the bladder was made. X-ray examination revealed fractures of all four pubic rami and a slight depressed fracture of the floor of the left acetabulum.

Under "Pentothal" anæsthesia a suprapubic incision was made, and the discovery of a distended bladder made the real diagnosis evident. The prevesical space was filled with blood, blood clot and fluid, which were sucked out. The bladder was then opened extraperitoneally and emptied of urine. A finger introduced into the prevesical space and passed downwards was able to make out the apex of the prostate displaced backwards and lying free. The ends of the ruptured urethra were about an inch and a half apart. A Jacques catheter was passed up the penile urethra, and its end was recovered and drawn up to the suprapubic region. The internal urinary meatus was exposed by retractors placed in the bladder, and a soft rubber catheter with an olivary point was passed downwards along the prostatic urethra. Its end was similarly recovered and brought out. The two ends were then sutured together and used to tow a small de Pezzer catheter from the bladder along the whole length of the urethra, the ruptured portions thus being brought together. The suprapubic wound was closed, a Winsbury-White catheter being left in the bladder and a tube in the cave of Retzius. The latter space was dusted with sulphanilamide powder. The uretheral catheter was fixed in position by a suture passed through the *glans penis*.

After operation, the patient was given a course of sulphathiazole by mouth, and his bladder was irrigated every four hours with a 1 in 4,000 solution of "Monacrin". The drainage tube was removed from the cave of Retzius after three days. There was no evidence of infection of the wound or urinary tract, and after fourteen days the suprapubic and urethral catheters were removed. This was done under "Pentothal" anæsthesia, the urethral catheter being cut at the glans and withdrawn through the suprapubic wound by means of a nylon suture, which had been brought out of the wound and fixed to the skin at the original operation.

Three weeks after the accident urethral bougies were passed without difficulty, and this operation was repeated

each week; at the time of the meeting a 12-15 Lister's bougie passed readily along the urethra. The pelvis had required no treatment beyond rest in bed, and eight weeks after the accident the patient was walking and passing his urine freely and with complete control.

Intraperitoneal Rupture of the Urinary Bladder.

Dr. Spencer next showed a man, aged thirty-two years, also a wharf labourer, who on September 5, 1945, had been squeezed against the side of a ship by a bale of wool, which struck the front of his abdomen. He immediately felt pain in the lower part of the abdomen and the epigastrium, which remained severe and continuous until operation. When the patient was examined four hours after the accident he was complaining also of pain in the shoulders. Generalized tenderness and rigidity were present over the abdomen, but there was no definite dulness in the flanks. A catheter passed along the urethra evacuated only about an ounce of slightly blood-stained urine. As the patient stated that he had not passed urine for seven hours before the accident, and that he had consumed about six beers in this time, the diagnosis presented no difficulty. There was no evidence of injury to the bony pelvis.

Under general anæsthesia the abdomen was opened above the pubis. The peritoneal cavity appeared to contain only a small quantity of urine, and in all about six to eight ounces were removed by sucker. No pronounced peritoneal reaction was observed. On the fundus of the bladder, and slightly to the left of the mid-line, was a rent running antero-posteriorly for about two inches, and involving all coats of the viscus for the whole of its length. The extra-peritoneal aspect of the bladder was exposed, and a Winsbury-White tube was introduced through a small incision. The rent in the bladder was then sutured in layers, plain gut being used, and the abdominal wound was closed around the catheter without drainage of either the peritoneal cavity or the cave of Retzius. Five grammes of sterile powdered sulphanilamide were left in the peritoneal cavity, and a similar quantity in the cave of Retzius and the abdominal wound.

After the operation a course of sulphamerazine was given. The suprapubic tube was removed on the ninth post-operative day, and the wound soon became dry. At the time of the meeting, sixteen days after operation, the patient was able to pass urine normally, and could hold his urine through the ordinary sleeping hours without discomfort.

NOTICE.

The General Secretary of the Federal Council of the British Medical Association in Australia has announced that the following medical practitioners have been released from full-time duty with His Majesty's Forces and have resumed or will resume practice as from the dates mentioned:

Dr. L. W. Tunley, Mayne Street, Gulgong, New South Wales (January 31, 1946).
Dr. A. R. H. Duggan, 185, Macquarie Street, Sydney (February 21, 1946).
Dr. A. M. B. Grant, 147, Macquarie Street, Sydney (February 11, 1946).
Dr. J. F. C. C. Cobley, 141, Macquarie Street, Sydney (February 25, 1946).
Dr. H. N. Merrington, 49, Belmore Road, Randwick, New South Wales (March 1, 1946).
Dr. Trevor A. Parry, "Alexandra", Wickham Terrace, Brisbane (May, 1946).
Dr. E. P. Row, Brisbane Clinic, Wickham Terrace, Brisbane (February 20, 1946).
Dr. C. M. McCarthy, 135, Macquarie Street, Sydney (March 4, 1946).
Dr. C. S. Colvin, 45, Anson Street, Orange, New South Wales (March 5, 1946).

Naval, Military and Air Force.

DECORATIONS.

Lieutenant-Colonel Leslie Ernest Le Souef has been created an officer of the Military Division of the Most Excellent Order of the British Empire "for bravery and devotion to duty in Greece and Crete".

Correspondence.

AN UNUSUAL CASE OF MALARIA.

Sir: I wish to report a case of malaria, contracted by a boy, aged eighteen years, who had never been outside New South Wales.

This boy was a clerk, working at Wellington, and had lived there since June 8, 1945. On February 2, 1946, he returned to his home in Orange, having been sick and feverish for one week.

Prior to his stay in Wellington, he had lived all his life in Orange, except for a visit to Sydney during Christmas, 1944, and a visit to Mandurama for two weeks in the winter of 1945.

His history was that of fever and violent shivering attacks, usually occurring about 10 a.m. each day. The parasite of benign tertian malaria was seen microscopically in a blood smear.

Yours, etc,
R. F. Matthews, M.B., B.S.

Orange,
Undated.

EPIDEMIC POLYARTHRITIS.

Sir: With reference to the report of Major P. G. Dowling (The Medical Journal of Australia, February 23, 1946) and earlier reports by Halliday and Horan, it is with some diffidence that I would draw your attention to an article in your journal of May 5, 1928, entitled "An Unusual Epidemic". The epidemic referred to by me in 1928 appears to be identical with that described by the above writers. It occurred in the Riverina and west of New South Wales in March-April, 1928.

My report was sent to the late Professor A. E. Mills, who added the title and sent it to your journal for publication.

Some years later, a few examples of an identical disease were seen by me in the Torres Strait area during the wet season. In 1928 I suggested that the disease was caused by biting flies that are so prevalent in the bush during the normal wet season in the north. The outbreak in the Riverina was associated with an abnormally wet season and a plague of these flies, as well as mosquitoes (culex).

A feature of this epidemic was the freedom of town-dwellers as opposed to the widespread incidence among country dwellers.

A further communication (The Medical Journal of Australia, June 9, 1928) discussed the differential diagnosis of dengue and the unusual epidemic.

Yours, etc.,
J. R. Nimmo.

Canberra,
February 25, 1946.

THE TREATMENT OF SCABIES.

Sir: During the war years there have been many articles in the journals, particularly the *British Medical Journal*, on the treatment of scabies. As recently as August 25, 1945, Lieutenant-Colonel Hellier reported in the *British Medical Journal* that D.D.T. has no preventive action against the acquirement of scabies. In view of this, I consider it worth reporting a case treated successfully with D.D.T. The patient, who was personally scrupulously clean, contracted scabies in 1942. When first seen he complained of pruritus in the left axilla. *Acarus scabiei* was found. No pruritus nor parasites were detected elsewhere. I advised shaving the axilla and prescribed *Unguentum Sulphuris*. Parasites appeared on other parts, concentrating mainly on the pubes. Sulphur treatment interspersed with home remedies was persisted with for three years. In October, 1945, when I was first able to obtain a small supply of D.D.T., I had compounded a solution of 2·5% D.D.T. in "Toxol", a proprietary preparation, as an insecticide. I supplied a few ounces to the patient and advised impregnating his underclothes, singlet and short underpants, by turning them inside out, spraying them with the solution by means of an insect spray, and allowing to dry overnight—the impregnated clothes to be worn throughout the day, pyjamas untreated at night, the routine to be followed daily for seven days. At the end of the third day the parasites had apparently disappeared, but one was found on the fourth day. The treatment was discontinued on the eighth day. The application caused no discomfort and there has been no reappear-

ance of the parasites in the ensuing four months. The type of case and persistence of infestation would tend to indicate that the precipitate deposited in the clothes was definitely the cause of cure, so that either the D.D.T., the "thanite" (a pyrethrum compound contained in the toxol), or a compound of both was the effective agent. Experiments conducted at the Australian Power Alcohol Company, Sarina, tend to show that D.D.T. does not always cause instantaneous paralysis or death, but insects may take from two hours to several days to die. Pyrethrum compounds, however, are said to have this "knock-down" effect, so that a combination of both may approach the ideal. As scabies is a rare complaint in my practice, I have no means of testing the various solutions, but I should say it is worth investigating as a much less unpleasant and repulsive method of treatment than is commonly used. Mr. Somerville, of the Australian Power Alcohol Company, drew my attention to the fact that D.D.T., when dissolved in fat soluble solutions, will penetrate the skin with toxic effect, and this has been demonstrated by several patients whom I have recently seen suffering from dermatitis accompanied by intense pruritus after being sprayed with an insecticide containing D.D.T.

Yours, etc.,

J. G. MORRIS.

Sarina,
Queensland,
February 19, 1946.

INGUINAL HERNIA AND ITS REPAIR.

SIR: The excellent article by Lieutenant-Colonel Harley Turnbull which appeared under the above heading in your journal of January 26, 1946, needs no amplification by me; having, however, also been a surgeon at the hospital to which Lieutenant-Colonel Turnbull refers during the greater part of the period under review and presuming, I hope correctly, that the series of seven hundred operations referred to includes two hundred and fifty-four performed by me and an unknown number by others under my supervision, I do not think it would be out of place if I were to state that I am in practically complete accord with all his statements.

It might be of interest to your readers if I were to summarize from my records the operations which I personally performed.

Indirect herniæ:	Left.	Right.	Total.
Herniotomy only	43	25	68
Modified Bassini repair	26	35	61
Direct herniæ	30	35	65
Direct and indirect herniæ	10	11	21
Total "primary" herniæ	109	106	215
Recurrent herniæ:			
Indirect	4	17	21
Direct	5	8	13
Direct and indirect	2	3	5
Total recurrent herniæ	11	28	39

In twenty-three instances the hernia was bilateral, some unfortunately being recurrences.

From the above figures it can be seen that of primary hernia operations: (i) approximately equal numbers occurred on either side; (ii) approximately 30% were treated by simple excision of the sac; (iii) approximately 30% were direct; (iv) in 10% direct and indirect sacs were present. Of recurrent herniæ (some following two previous operations): (i) 70% occurred on the right side; (ii) over 50% were indirect; (iii) over 10% had both direct and indirect sacs.

Patients for herniotomy only were carefully chosen and the operation was performed through a minimal incision placed over the site of the internal inguinal ring with no disturbance of the cord from its bed. Fine silk was always employed, and, in addition to doubly transfixing and ligating the neck of the sac, it was anchored to the transversalis fascia about one and a half centimetres above the internal ring. In such cases patients were permitted to get up a few days after operation; I know of but one in which recurrence took place, though doubtless there have been others.

Repairs were done by a technique almost identical to that described by Lieutenant-Colonel Turnbull, modified to suit individual cases.

I lay great stress on the repair of the transversalis fascia; in my opinion, apart from the complete removal of the sac, it is the most important factor in herniorrhaphy.

The proportion of direct and "bisac" herniæ may seem unduly high, but it must be remembered that it was my policy to operate on the "snags" leaving most of the presumably less difficult cases to my junior colleagues.

In all cases of direct hernia an attempt was made to remove the sac. Where both direct and indirect sacs were present each was removed separately.

With few exceptions all the recurrent cases followed on some type of repair operation, though it was often difficult to ascertain what had been done by the previous surgeon.

Spinal anæsthesia was employed in practically every instance, and no skin preparation other than shaving and washing was carried out in the wards. Undiluted "Dettol" and spirit, later "Zephiran" and spirit, were used in the theatre. I recall only two cases of wound sepsis both of whom discharged silk stitches and, for all I know, may still be doing so.

Yours, etc,

L. S. LOEWENTHAL,
Lieutenant-Colonel, Australian Army Medical Corps, Australian Imperial Force.

Sydney,
February 20, 1946.

AUSTRALIA AND SCIENCE: THE UNIVERSITY OF SYDNEY AND SCIENTISTS.

SIR: To do justice to the University of Sydney an insignificant error in your leading article on "Australia and Science" should be corrected. Not all senior lecturers at that institution receive £600 *per annum*; a few have by lapse of time earned the princely annual income of £750. When allowance is made for the purchasing power of money, it is doubtful if this maximum salary for senior lecturers is worth more than was £300 in the first decade of this century—in the days when treasurers had not conceived the thought of assuaging their voracious appetites with ever larger bites of income tax. It would be interesting to know what monetary value the university administrators of those days placed on the services of senior lecturers.

Professors, like lecturers, must live and provide for their wives and children; so the Senate has wisely increased the minimum professorial salary from £1,100 to £1,250 *per annum*. If one reads correctly a very recent advertisement, it would appear that as an added inducement to become, or to remain, a professor, the Senate is offering to pay £400 *per annum* superannuation in addition to the benefits derived from the already existing contributory scheme. It would appear that the Senate considers that the university derives two-thirds as much benefit from a professor in retirement as from a senior lecturer in active employment. It might be more equitable, if not more politic, to distribute some of these retirement bounty funds among the less well paid members of the staff, for it must be unconscionably difficult for a senior lecturer with several children—and one assumes that academically it is conceded that they may be allowed such luxuries—to provide the bare necessities of life and so to free himself from domestic chores that he will have at least some opportunity and leisure to think. One is conservative enough to believe that a university does want its lecturers—and professors—to be able to think—an exercise which is not performed most effectively while fighting to keep the wolf from the door with a broom in one hand and a napkin in the other.

A regrettable feature of the poor remuneration of the staff of the University of Sydney is that the salaries paid by such an institution are often used as an argument for keeping salaries of university graduates at undesirably low levels. It would seem that there is a fear lest a more adequate financial reward paid to an extra-mural graduate might raise his status above the academic level.

Perhaps it is a related line of thought which leads the University of Sydney to pursue its present miserly policy in the matter of lecturers' salaries. Possibly their status more than compensates for their lack of income; but if so, why should the enjoyment of professorial status need to be eked out by salaries about twice those paid to senior lecturers and supplemented after retirement by an annual bonus of £400—paid presumably to compensate for status then lost.

Might one suggest that while such inequitable anomalies exist the motto of the university should be *"Eadem mens in corpore insano"*. There are, however, more important matters than salaries or mottoes. Neither a change of motto nor a revision of staff salaries will revivify the intellectual life of a university which lacks the genius to breathe into its teachers and its students that divine longing for knowledge and for the unfettered exercise of original and critical thought which led the students of the middle ages to form

the cultural nuclei from which the most famous universities have grown and descended. Between teacher and student there must exist a bond of mutual intellectual inspiration, each being for the other a fertile stimulus to think, to seek and to learn. Poor teachers will not inspire good students, poor students will drive out the best of teachers. It is the duty of university administrators to find inspiring and stimulating teachers and to provide them with ample facilities to satisfy their intellectual desires and with salaries adequate to supply their reasonable material needs. It is for the community to provide students in whom the childhood spirit of inquiry has survived till adolescence, unextinguished by an educational system which exalts dogma, decries originality and stifles criticism. Ultimately a community fosters such universities as it deserves. Unless a university is an intimate part of a worthy body corporate, of a community which values ethics and intelligence more than estate or material success, and which thinks the game of more importance than the score, what present or future greatness can it hope for? Universities are not great by virtue of the hordes of students which infest their halls, but by reason of the intellectual and ethical inspiration which flows from them, to benefit not only the communities which brought them into being, but all humanity.

Yours, etc.,

16, David Street,
Clifton Gardens,
New South Wales.
March 1, 1946.

A. J. CANNY.

ULCERS IN THE MOUTH: AN APPEAL FOR HELP.

SIR: In reply to the appeal for help of the doctor suffering from painful mouth sores, I am glad to be able to advise him. The treatment during the acute stage is: penicillin lozenges 1,000 units each, two hourly to be kept in mouth for two or three days.

I witnessed five favourable results of such treatment during my recent stay at a New York general hospital.

Yours, etc.,

New Farm,
Brisbane,
Undated.

I. ROXON-ROPSCHITZ.

RECENT ADVANCES IN THE DIAGNOSIS AND TREATMENT OF LUMBAR INTERVERTEBRAL DISK DISEASE.

SIR: Dr. Miller has stated (THE MEDICAL JOURNAL OF AUSTRALIA, February 23, 1946) that anyone with little experience, after reading our papers, might be left with the idea that the pathology of low back pain is simple, diagnosis not difficult, and neurological examination unnecessary. In the great majority of patients this is so.

But Dr. Miller is not justified in suggesting that the impression might be gained that Dr. Clark and I advocate certain surgical treatment as orthodox and obviously beneficial. As a matter of fact I stated that "if one recognizes the early stages of disk disease, one will adopt treatment which will, I hope, render these spectacular surgical measures much less frequently necessary than at present", and Dr. Clark spent quite some time in discussing our surgical failures.

My reasons for regarding minor low back strains as diskogenic have been stated previously, and to reiterate them here would be redundant.

Dr. Miller states that, if pain is relieved by injecting a muscle with a local anæsthetic, then that pain is generated in the muscle. I would reply that this does not necessarily mean that the primary cause of the pain is in the muscle. The work of Elliott on electromyographic studies in sciatica and of Lewis on the pain-producing factor in muscle would appear to offer a simple explanation of the point raised by Dr. Miller. A disk lesion, by involving motor fibres in nerve roots, either directly or reflexly, can and does lead to areas of spasm in muscle. These areas may be painful, and the pain may be relieved by injecting a local anæsthetic.

I would direct Dr. Miller's attention to three articles in *The Lancet* of October 6, 1945. Crisp condemns a diagnosis of fibrositis and discusses minor and major disk injuries. Burns and Young state that the chief cause of recurrent low back pain is protrusion of a disk and mention sacro-iliac strain and fibrositis as ill-defined lesions of doubtful frequency. Cyriax will not accept a diagnosis of postural backache, is sceptical of the existence of a widespread lumbar fibrositis and has not diagnosed it in his last five hundred cases of low back pain. Sir William Gowers, who introduced the term fibrositis, admitted that he had no microscopical evidence of its existence—evidence which, according to Elliott, is still lacking forty years later. Reinforced, therefore, by these and other opinions, for example, those of Dandy and Keys, I can offer Dr. Miller little expectation of fulfilling his hope that I will allow the lumbar muscles many "pains in their own right".

Yours, etc.,

Mount Hawthorn,
Western Australia,
March 2, 1946.

JAMES H. YOUNG.

ON THE PRICKLY HEAT.

SIR: The authors of the article "On the Prickly Heat" which appeared in THE MEDICAL JOURNAL OF AUSTRALIA of December 22, 1945, deserve great credit for their enthusiasm. It is obvious that they worked under difficulties to collect their data, and that circumstances beyond their control prevented them from obtaining a larger number of cases.

It is, nevertheless, a pity that they have drawn so many unjustified conclusions from such preliminary work. It would take too much space to discuss their findings in detail, but, by way of example, one may refer to their conclusion that light complexion is a factor which increases the liability of a person to prickly heat. They found that, of thirteen people with light complexion, 53·8% developed a rash, whereas of 33 people with medium or dark complexion, only 33·3% developed a rash. Now, it can readily be shown that if there were no difference between the incidence of prickly heat amongst light-skinned people, on the one hand, and medium-skinned and dark-skinned people on the other, samples of 13 of the former and 33 of the latter would show a difference at least as great as that exhibited above in about 20 out of 100 instances. In other words, there is a one in five chance that the difference obtained by the authors resulted from a sampling variation and not from a real difference in the original groups.

The authors state that they realize that the numbers concerned are small "and therefore subject to the usual statistical fallacies". It is widely believed that conclusions drawn from small numbers of cases are necessarily uncertain and that reliable results can be obtained only when the numbers investigated are large. There is an element of truth in this, but it must be remembered that there is no fixed rule as to what constitutes an adequate number of cases. This is a relative matter: it is relative to the variation encountered. A physicist may have the conditions of his experiment so well controlled that he will put reliance on a single result. It is, therefore, not satisfactory for authors to issue a general warning that they have only a small number of cases, which are subject to the usual statistical fallacies, especially if they go on to draw definite conclusions from their data. An investigator can sometimes be readily forgiven for having small numbers of cases, but not so readily excused for publishing untenable conclusions drawn from his study of them.

Yours, etc.,

43, Torrens Street,
Braddon,
Canberra.
March 2, 1946.

COLIN WHITE.

Medical Practice.

DANGEROUS DRUGS REGULATIONS OF VICTORIA.

THE attention of Victorian medical practitioners is directed to the following amendments of the Dangerous Drugs Regulations which were published in the *Victoria Government Gazette* of September 19, 1945.

2. At the end of Regulation 18 in the "Dangerous Drugs Regulations, 1930", add the following clause:

(1) No person shall dispense a prescription for a dangerous drug, which prescription bears a date more than six months prior to its presentation.

3. Regulation 34 of the "Dangerous Drugs Regulations, 1930", as amended by the "Dangerous Drugs

Regulations, 1932", is hereby rescinded, and the following regulation shall be substituted therefor, namely:

(34. (1)) No person, except as otherwise hereinbefore provided, shall dispense any prescription containing any specified drug unless—

(a) such prescription bears the signature of the medical practitioner or veterinary surgeon or dentist by whom it purports to be given, and

(b) he has no reason to suppose that the prescription is not genuine.

(2) Such prescription shall not be dispensed more than once unless the prescriber has indicated on the face of the prescription that it is to be dispensed more than once at a specific interval or intervals.

(3) The prescription shall be marked, stamped or legibly inscribed by the dispenser with the name of the chemist dispensing it and with the date on which it is dispensed.

(4) The person who dispenses the prescription on the last occasion permitted under these regulations as determined by clause (2) hereof shall in addition to the requirements of clause (3) hereof also stamp, mark or inscribe in durable and legible letters across the prescription the word "Cancelled".

(5) A prescription for a specified drug when cancelled must be retained by the chemist dispensing it on a special file kept for the purpose for a period of at least two years.

(6) No person shall dispense a prescription for a specified drug which prescription bears a date more than six months prior to its presentation.

(7) The provisions of Regulations 33 and 34 (2) shall not apply to the sale or delivery of any specified drug by a registered pharmaceutical chemist on the certificate or written authority signed by a duly qualified medical practitioner, stating that any drug is required for a person suffering from epilepsy or any chronic or malignant disease: Provided that such certificate or authority is dated and delivered to the registered pharmaceutical chemist by the medical practitioner prior to the first sale or delivery of such drug, and that the original prescription or written order is retained by the said chemist and attached to the prescription book opposite the entry required to be made by him under the regulations made under the *Medical Act*, 1928: Provided further that no sales or deliveries shall be made after six months from the date of issue of such certificate or authority.

THE POLICE OFFENCES (AMENDMENT) ACT OF NEW SOUTH WALES.

THE following amending regulation under the *Police Offences (Amendment) Act*, 1908, of New South Wales, as amended by the *Police Offences (Drugs) Act*, 1927, and the *Police Offences Amendment (Drugs) Act*, 1934, was published in the *New South Wales Government Gazette*, Number 8, of January 25, 1946.

Regulation 19 is amended by the addition of the following new paragraph.

(7) No person shall dispense any prescription for a drug or supply a drug upon any prescription which bears a date more than six months prior to its presentation.

Post-Graduate Work.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE'S PROGRAMME FOR APRIL.

THE Melbourne Permanent Post-Graduate Committee announces the following programme for April, 1946:

Continuous Refresher Course.

The second series of refresher classes for service and ex-service medical officers will commence on April 1. It will be conducted on four days of each week at the Royal Melbourne, The Alfred, Saint Vincent's and Children's Hospitals, and will run for two months.

University Classes.

University classes for Part I of the higher degrees and diplomas, commenced in March, will be continued.

Course for M.D. (Part II) and M.R.A.C.P.

The series of clinical lecture-demonstrations designed for candidates for the M.D. (Part II) and M.R.A.C.P. examinations will be continued on Tuesday afternoons from 2.15 p.m.: April 2, by Dr. L. E. Hurley on "Chronic Diarrhœa". April 9, by Dr. W. S. Newton on "Pulmonary Tuberculosis". April 16, by Dr. J. G. Hayden on "Hepatic Disorders". April 30, by Dr. C. H. Fitts on "Modern Diagnostic Methods in Cardiac Conditions".

Course for Teachers.

The course on modern methods and technique in teaching will be concluded in April with the following demonstrations in the Arts Building, Melbourne University, at 8 o'clock p.m.: Thursday, April 4: (a) Films. (b) The question of effective speech in lecturing and teaching. Thursday, April 11: Short lecturettes, with discussion and general comment. Both classes will be conducted by Professor Browne.

Enrolments for courses should be made with the Secretary, Post-Graduate Committee, College of Surgeons, Spring Street, Melbourne, C.1.

OVERSEAS TRAVELLING FELLOWSHIPS.

THE following notes, which may assist candidates for the overseas fellowships of the Nuffield Foundation, the Rockefeller Foundation, and the Carnegie Trust in providing the information required in the application form, are published at the request of the Acting Director-General of Health, Canberra.

Name of Foundation or Trust.—Only one application form need be completed. Should a candidate desire to be considered for another fellowship, in the event of an application for his first choice being unsuccessful, he may state his order of preference in a covering note attached to his application.

Details of Teaching or Research Appointment.—Candidates who have at present no such appointment, but have applied for one, and are awaiting the result of the application, should state these details.

Subject of Proposed Study or Research in Detail.—The detail supplied should be sufficient to inform the Selection Committee of the candidate's general intentions and desires, so that the Foundations or other appropriate bodies may place him to his best advantage on arrival overseas.

Department, University, College, Hospital or Clinic where it is Proposed the Work will be Carried Out.—Many candidates may be unable to give the necessary details. They may rest assured that failure to do so will not prejudice their application, but that the Selection Committee and the Foundation concerned will give every assistance to ensure that Fellows obtain the best available facilities for their studies or researches.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Commins, Lloyd Angus, M.B., B.S., 1940 (Univ. Sydney), 179, Wardell Road, Dulwich Hill.

Croese, Kelvin Xavier, M.B., B.S., 1944 (Univ. Sydney), "Greenleaves", Raymond Terrace, New South Wales.

Bellemore, Charles Francis, M.B., B.S., 1943 (Univ. Sydney), Saint Vincent's Hospital, Darlinghurst.

Musso, Fedele John Andrew Leo, M.B., B.S., 1945 (Univ. Sydney), 469 Forest Road, Penshurst.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Higham, Robert Harvey, M.B., B.S., 1945 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

Horsman, Sherwood Arthur, M.B., B.S., 1940 (Univ. Sydney), NX138194, Captain, D.D.M.S., N.S.W. L. of C. Area.

Ireland, Joseph Frank, M.B., B.S., 1940 (Univ. Sydney), NX104569, Captain, 1, Transvaal Avenue, Double Bay.

Kirtle, Patricia, M.B., 1931 (Univ. Sydney), Broughton Hall, Leichhardt.

Macbeth, Robert Duncan, M.B., B.S., 1940 (Univ. Sydney), 13, Iluka Road, Mosman.
McManis, Arthur Geoffrey, M.B., B.S., 1936 (Univ. Sydney), 283, Cleveland Street, Redfern.
Millingen, Keith Samuel, M.B., B.S., 1945 (Univ. Sydney), Sydney Hospital, Sydney.
Moseley, Moira Shirley, M.B., B.S., 1943 (Univ. Sydney), 94A, Birriga Road, Bellevue Hill.
Orban, Thomas Desiderius, M.B., B.S., 1945 (Univ. Sydney), Sydney Hospital, Sydney.
Rich, David Louis, M.B., B.S., 1945 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.
Richards, Charles Rowland Bromley, M.B., B.S., 1939 (Univ. Sydney), 80, Kensington Road, Summer Hill.
Schuster, Elizabeth Mary, M.B., B.S., 1945 (Univ. Sydney), Broken Hill and District Hospital, Broken Hill.
Scott-Young, Norman Reginald, M.B., B.S., 1941 (Univ. Sydney), 108, Wangarella Street, Balgowlah.
Stanley, Malcolm Roberts, M.B., B.S., 1941 (Univ. Sydney), 32, Sutherland Road, Beecroft.
Taylor, John Lindsay, M.B., B.S., 1939 (Univ. Sydney), Prince Henry Hospital, Little Bay, Sydney.
Williams, John Robert Trevor, M.B., B.S., 1945 (Univ. Sydney), Base Hospital, Dubbo.

Australian Medical Board Proceedings.

QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of *The Medical Acts, 1939 to 1940*, of Queensland, as duly qualified medical practitioners:

Macindoe, Philip Hudson, B.S., 1935 (Univ. Sydney), "Merchiston", Garfield Drive, Paddington, Brisbane.
Murphy, Gregory Bernard Vincent, M.B., B.S., 1932 (Univ. Melbourne), M.D., 1938 (Univ. Melbourne), M.R.A.C.P., 1938, M.R.C.P. (London), 1940, Lester House, Wickham Terrace, Brisbane, B.17.

The undermentioned additional qualification has been registered:

Macindoe, Philip Hudson, Wickham House, Wickham Terrace, Brisbane, B.17, (M.B., 1935, Univ. Sydney), F.R.C.S. (Edinburgh), 1937.

A MEMORIAL TO THE LATE PROFESSOR JAMES THOMAS WILSON.

AN appeal is being made by the University of Sydney Medical Society for funds to establish a memorial to the late Professor James Thomas Wilson. The society suggests that the memorial be an annual prize in anatomy open to students in medicine. Contributions may be sent to Mr. I. J. Hunter at the Old Medical School; cheques should be made payable to the "Wilson Memorial Fund". Mr. W. A. Selle, Professor A. N. Burkitt and Mr. I. J. Hunter are trustees of the fund.

Obituary.

WILFRED VICKERS.

WE regret to announce the death of Dr. Wilfred Vickers, which occurred on March 9, 1946, at Parramatta, New South Wales.

Medical Appointments.

The following have been appointed honorary clinical assistants at the Royal Adelaide Hospital: *Medical Section:* Dr. R. N. C. Bickford, Dr. J. M. Bonnin, Dr. A. H. Finger, Dr. E. Flaum, Dr. J. F. Frayne, Dr. O. B. Lower, Dr. I. S. Magarey, Dr. M. W. Miller, Dr. J. M. Pedler, Dr. R. A. A. Pellew, Dr. C. T. Piper, Dr. C. B. Sangster, Dr. F. G. T. Turner, Dr. R. F. West. *Surgical Section:* Dr. J. R. Barbour, Dr. N. J. Bonnin, Dr. A. G. Campbell, Dr. J. R. Cornish, Dr. D. C. Dawkins, Dr. G. M. Hone, Dr. J. E. Hughes, Dr. W. W. Jolly, Dr. S. Krantz, Dr. J. R. Magarey, Dr. N. H. Munday, Dr. A. C. McEachern, Dr. D. G. McKay, Dr. L. J. T. Pellew, Dr. J. L. S. Scott, Dr. G. H. Solomon. *Allergy Clinic:* Dr. J. E. Bateman. *Dermatological Section:* Dr. W. Gilfillan, Dr. C. H. Schafer, Dr. A. J. Hakendorf, Dr. F. G. T. Turner. *Radium Section:* Dr. B. S. Hanson. *X-Ray Section:* Dr. B. C. Smeaton, Dr. B. S. Hanson. *Ophthalmological Section:* Dr. D. O. Crompton, Dr. T. L. McLarty, Dr. S. Pearlman. *Orthopædic Section:* Dr. N. S. Gunning, Dr. N. P. Wilson.

Diary for the Month.

MARCH 19.—New South Wales Branch, B.M.A.: Medical Politics Committee.
MARCH 19.—New South Wales Branch, B.M.A.: Ethics Committee.
MARCH 20.—Western Australian Branch, B.M.A.: General Meeting.
MARCH 21.—Victorian Branch, B.M.A.: Executive Meeting.
MARCH 21.—South Australian Branch, B.M.A.: Council Meeting.
MARCH 22.—Queensland Branch, B.M.A.: Council Meeting.
MARCH 26.—New South Wales Branch, B.M.A.: Council Quarterly.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All Public Health Department appointments.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2).

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such a notification is received within one month.

SUBSCRIPTION RATES—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad per annum payable in advance.